NORMAN A. JOHNSON
Editor

CHARLES A. WHITEHEAD
Managing Editor

MYRON D. REESER
Business Manager

HERBERT A. STAUDERMAN
Advertising Manager

JAMES A. DOYLE
Promotion Manager

WILLIAM J. O'CONNOR
Production Manager

BERYL A. LAKNER
Circulation Manager

OFFICIAL PUBLICATION OF THE PROCEEDINGS, AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January, 1949. Published every other Monday, by the **HOWES PUBLISHING COMPANY, INC.**, 44 East 23rd Street, New York 10, N. Y. **C. R. Howes**, President; **Ernest J. Finan**, Executive Vice-President; **Norman A. Johnson**, Vice-President & Treasurer; **Myron D. Reeser**, Vice-President; **C. Essenbreis**, Secretary.

Telephone SPring 7-9364

AMERICAN
DYESTUFF REPORTER
DEVOTED TO TEXTILE WET-PROCESSING

contents

VOLUME 46 February 11, 1957 NUMBER 3

aatcc proceedings

feature articles

The Sulfur Dyes P83
John L Crist and R E Rupp

The Interaction of Cellulose with Simple Salt Solutions and with Dyebaths P87
Mary Moncrieff-Yeates and Howard J White

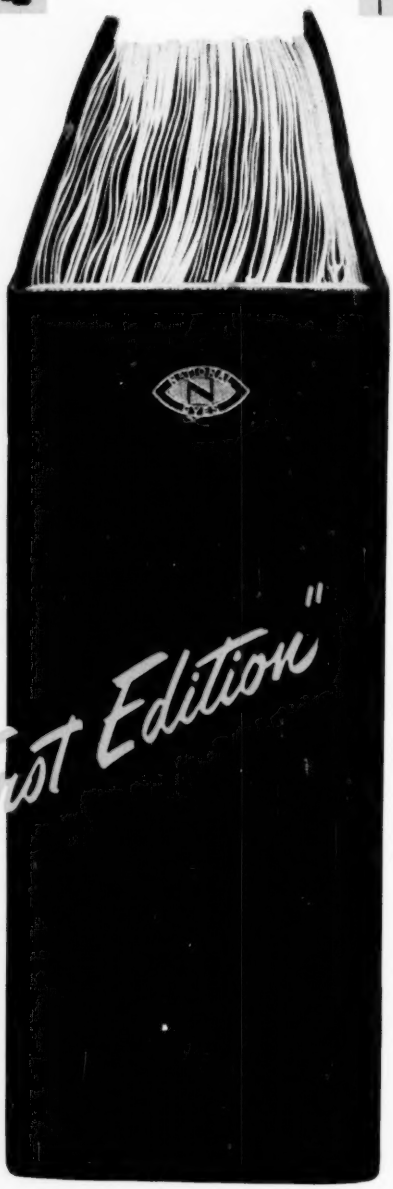
miscellaneous

Activities of the Local Sections P81
AATCC Newsletter P82
Olney Medal Award Candidates P86
AATCC Calendar P96
Minutes—204th Council Meeting P97
Membership Applications P104
Employment Register P104

departments

Patent Digest 105
Paul Wengraf
Index to Patent Digest 107
Abstracts 108
News of the Trade 111
General Calendar 116
New Products and Development 117
Names in the News 119

Copyright, 1957, Howes Publishing Co, Inc
Contents of previous issues can be found by consulting the Industrial Arts Index and the Engineering Index, Inc. at your library



this priceless "First Edition" is free!

A shade card is a costly reference book that you use every day. It may summarize the results of more than 25,000 individual tests. Often it contains swatches of more hues than many dyehouses do in a year!

If you had to compile the detailed data yourself the cost would be prohibitive. But, fortunately, first-line dye manufacturers provide the needed information as an essential customer service. It's an important part of value-received that never appears on your invoice!

National shade cards are the most complete in the industry, often going beyond AATCC standards to furnish extra detail. Inserts are published to keep them up-to-date. And National shade cards are reliably accurate in evaluating the dyes objectively. You can rely upon them as a guide in your use of National Dyes.

These elaborate shade cards reflect the conviction that our responsibility extends beyond the simple exchange of dyestuffs for dollars! When price-differentials exist, it is often because the low-price supplier delivers less in product and service combined.

To be sure of getting full value every time, it's good business to do business with National.

NATIONAL ANILINE DIVISION

ALLIED CHEMICAL & DYE CORPORATION • 40 RECTOR ST. NEW YORK 6, N. Y.

Akron Atlanta Boston Charlotte Chattanooga Chicago Columbus, Ga. Greensboro Los Angeles
New Orleans Philadelphia Portland, Ore. Providence Richmond San Francisco Toronto

Proceedings of the
American Association of Textile Chemists and Colorists

Copyright, 1956, American Association of Textile Chemists and Colorists

FEBRUARY 11, 1957

Activities of the Local Sections

Niagara Frontier

THE Niagara Frontier Section held its first meeting of 1957 on Friday, January 11, in the Science Building, Canisius College, Buffalo, New York. Approximately thirty members and guests were present to hear J P Neary, E I du Pont de Nemours & Company, Inc, deliver an informative talk on "Dyeing Orlon Acrylic Fiber—Application of Cationic Dyes." The dyeing of Orlon in the raw stock form, tow, skeins, fabrics, and blends, with the new Sevron dyes was described by the speaker. A short discussion period followed the talk.

During the business meeting, Chairman W H Leyking, National Aniline Div, gave details of the February 2 meeting of the CATCC to which members of this Section were cordially invited.

B K Easton announced the program for the March 15 meeting of the Niagara Frontier Section, which will comprise a tour through the Becco Chemical Division plant in Buffalo, New York, as well as a lecture on different applications of hydrogen peroxide. The sectional committee meeting will be held on the same date prior to the technical meeting.

Washington

THE Washington Section will hold its first meeting of 1957 on Friday, Feb 15 at the National Housing Center Auditorium, 1625 L St, Washington, DC.

The technical program will consist of a symposium on "Floor Coverings." Both segments of the floor-coverings industry will be represented. K R Stephenson, assistant general sales manager of the Armstrong Cork Co, will discuss recent developments in the resilient floor coverings field, and T F Jacoby, chief chemist at A & M Karagheusian, Inc, will represent the soft floor coverings group with the latest information on rugs and carpets. A question-and-answer period will follow.

Mid-West

THE mid-winter meeting of the Mid-West Section will be held this Saturday, February 16, at the Hotel Bismarck, Chicago, Ill.

The afternoon session, beginning at 3 pm, will feature a talk by Arthur Klein, American Cyanamid Co, Bound Brook, NJ, on "The Development of Color".

At the evening session, beginning 7 pm, Neva Cedarholm, head designer for Munsingwear, Inc, Minneapolis, Minn, will highlight an important phase of the industry, "The Development of Color for Sales."

New York

V LINDSAY CHASE, Interchemical Corp, will be the featured speaker at the March 1 meeting of the New York Section at the Hotel Delmonico, New York, NY.

In conjunction with his talk, Mr Chase will present the film, "This Is Color."

Interchemical Corporation published its Three Monographs on Color approximately twenty years ago. These covered the science of color and its use. The present film, "This Is Color" is a modernized adaptation of Volume II of the Monographs.

To ensure that the activities of your Section receive proper publicity in the Proceedings, it is desirable that material be submitted direct to American Dyestuff Reporter, 44 E 23rd St, New York 10, N Y.

ADVANCE NOTICES OF MEETINGS———Copy must be submitted *at least two weeks* prior to the publication date. ADR is published on alternate Mondays. It is urged that that dates be taken into consideration when copy is submitted.

Advance notices should include the date and site of the meeting; the speaker's name, position, business affiliation, and subject; a short abstract of the paper (optional); details of additional meeting highlights, eg, nominations or election of officers, special awards, activities of Sectional committees, etc.

MEETING REPORTS———Complete reports should be submitted as soon as practical after a meeting. Information should include attendance figures; captioned photographs of meeting principals (speaker, section officials, etc); and any additional points not covered in the advance notice. An extensive resume of the speakers' remarks is not necessary if the paper is to be submitted for full publication in the Proceedings.

PAPERS———Two copies of each paper presented before local sections should be sent to the offices of the American Dyestuff Reporter. It is very important that every speaker be acquainted with the "Notice to Authors", which appear periodically in the Proceedings. Additional copies of said notice will be sent to section officials on request.

It is imperative that each Section appoint an official whose responsibility it is to see that the speaker's remarks are submitted. In cases where prepared manuscripts are not immediately available to the Section official, it may be necessary to acquaint the author with the address to which he should send his material when it is finally prepared.

In cases where the material is extemporaneous (panel discussions, question-and-answer periods, open forum, etc) it is the responsibility of the Section to provide for stenotype service, so that a complete record may be available.

PRESENTATION OF A PAPER BEFORE A LOCAL SECTION DOES NOT GUARANTEE PUBLICATION IN THE PROCEEDINGS. AS THE FINAL DECISION RESTS WITH THE AATCC PUBLICATIONS COMMITTEE. However, most papers will be acceptable provided they conform in content and layout to established practices of AATCC.

AATCC NEWSLETTER...

FEBRUARY 11, 1957

RESEARCH NEWS IN GENERAL:

AATCC has withdrawn from membership in the Consumer Research Panel of the American Standards Association, because so few textile matters came before the Panel, and the AATCC representative, in any case, could not vote on consumer standards matters . . . The Executive Committee on Research (at a recent meeting in New York) decided that its membership should include two from the Southern region, two from Middle Atlantic, one from New England and one from the West. . . . To fill vacancies created by this membership policy, Joseph H Jones and V B Holland were nominated (and confirmed by Council) as new ECR members. . . . Present AATCC test methods on fiber identification, in the Year Book, will be replaced by those of American Society for Testing Materials, beginning with the 1957 AATCC Year Book. . . . Also at the recent ECR meeting it was reported that the Lightfastness Committee had prepared a preliminary draft of a proposed daylight test for submission to ISO; the committee also plans to submit a carbon arc test. . . . ECR recommended that the Council's Intersociety Relations Committee name an observer from AATCC to attend a proposed organizational meeting for a National Committee on Surface-Active Agents, being formed by Emery Valko. . . . Next meeting of ECR will be 9 AM Friday, March 29, at the Roanoke Hotel, Roanoke, Va.

NEWS FROM RESEARCH HEADQUARTERS:

Dr Harold Stiegler, director of research, reports that the AATCC laboratories at Lowell are presently doing work for the following research committees: Abrasion, Dimensional Stability, Flammability and Washfastness. . . . Charles A Sylvester, recently confirmed as head of Technical Committee on Research, reports that the next TCR meeting will be held all Friday, March 29, and Saturday morning, March 30. . . . The usual TCR luncheon will be Saturday the 30th rather than Friday. . . . In place of the regular technical session, TCR will take over part of the Piedmont Section's afternoon meeting schedule, calling on selected committees to make research reports of particular interest to the South.

COMMITTEE NEWS:

In addition to re-appointing Charles Sylvester as TCR Chairman, Council also recently approved the appointment of C L Zimmerman, J H Jones and V B Holland to that Committee. . . . The National Research Advisory Committee has been disbanded, on recommendation of Chairman E W K Schwarz, having completed its assigned function. . . . At the request of TCR, Richard Aurich was appointed new chairman of the Committee on Damage Caused by Chlorine Retention, and the request of the committee for $1,000 to cover the cost of 3,000 yards of material, plus smaller yardages of colored fabrics, was approved, as was the same Committee's request to begin a project at Lowell labs. . . . John V Killheffer was approved as chairman of a Committee to investigate a new method of evaluating evenness of package dyeing, developed by K Dorman, of Franklin Process Co, and offered to AATCC. . . . At the request of the Standard Soils Committee, the scope of this committee's work has been defined as relative to "soils to be removed by textile mills (sizes, natural fiber impurities, etc.)"

Perkin Centennial———

THE SULFUR DYES*

JOHN L CRIST and R E RUPP
Southern Dyestuff Corp
Charlotte, NC

This presentation considers the general nature and properties of sulfur dyestuffs —their virtues and limitations, places in the textile industry where they may be used to best advantage, as well as places where they are not suitable.

It further deals with the production of and research developments in sulfur dyes, the advances that have been made, and ones that may be expected through research—or are at least within the realm of possibility.

Various procedures for dyeing with sulfur dyes are reviewed, along with recently developed or improved processes with respect to both piece goods and yarn dyeing.

INTRODUCTION

THE sulfur dyes are the synthetic organic substantive dyestuffs which are customarily applied to cotton and other cellulosic fibers from a reduced sodium sulfide dyebath. These dyes are, generally speaking, insoluble in water and are dissolved and reduced to a leuco compound in an alkaline dyebath containing sodium sulfide or sodium hydrosulfite as the reducing agent. They have been in practical commercial usage in most countries of the world for many decades. The appeal of the sulfur dyes is due to their durability, their flexibility of application, and their characteristically high money value.

The latest United States Tariff Commission reports show that in 1955 approximately twenty-five million pounds of all sulfur dyes, having a value of $6,600,000, were produced and sold in the United States. This is approximately 16% of the volume and 3½% of the dollar value of all dyes made in that period. The sulfur dyes are, according to this authority, produced by as many as eight separate dyestuff-producing companies in this country.

Of all the sulfur dyes, the blacks, the blues, and the browns are the most important from the standpoint of tonnage or quantities.

Prior to World War II, Japan was the largest producing country of the sulfur dyes, followed, in order, by Germany and the United States. Both Japan and Germany have made rapid strides to rebuild their sulfur dyestuff industry since they are low-cost producers and much of their production goes to export. Based on available information, it is believed that the United States is, at present, the largest producing country in the world of the sulfur dyes. A number of the more densely populated countries which use rather large quantities of the sulfur dyes are now making sulfur black and some of the other sulfur dyes. These are produced for their own requirements as well as for export. Sulfur black and some of the other sulfur dyes are currently being produced in China, India, the USSR, Brazil, Mexico, as well as a number of European countries and the United Kingdom.

While the volume and the dollar value of the sulfur dyes is lower than that of some other classes of dyes in relationship to quantity and value of all dyestuffs produced, yet they have an importance disproportionate to their dollar value. These dyes are important in producing a wide range of shades on a very wide range of cotton and rayon fabrics, and especially on the heavy, durable shades of apparel fabrics, since they have properties of "building" deep shades which some other groups of dyestuffs singularly lack. To illustrate this feature, a rule of thumb for cost is often used which states that the production of a given shade of blacks, browns or blues will cost seven to ten times as much with anthraquinone vat dyes as it will with the sulfur dyes. Then again, the importance of the sulfur dyes to the textile industry, the garment industry, and the consuming public, is pointed up when one considers the fact that the more conventional shades of blacks, browns, blues, greens, etc., are obtainable at a dye stuff cost in the range of 3¢ to 6¢ per pound, based on the weight of the fabric. At going prices of cotton and rayon fabrics, this would indicate that the $6,600,000 value of sulfur dyes annually produced goes into fabrics having sales value of a figure in the neighborhood of $300,000,000 or more.

DISCUSSION

The sulfur dyes generally are produced by thionation or sulfurization of organic intermediates of the nitro and the amino groups. These reactions are carried out under elevated temperatures in closed equipment, with and without solvents. After thionation, they are precipitated by acid or oxidation, or both, and are supplied to the consuming industry in the form of dry, standardized powders, pastes, or the more modern ready-to-dye reduced liquid solutions. In their manufacture, and from the standpoint of their raw materials, they are closely related to many of the vat dyes which are often produced by similar thionation methods, differing only in the organic intermediates employed. Some of the sulfur dyes, particularly the blues and other recently produced colors, are closely related to the vat dyes and may be used as well from a hydrocaustic dyebath as from a sulfide dye bath. The reverse is also true, as certain of the vat dyes may also be applied from baths of sodium sulfide and sodium hydrosulfite, and in these and other vital respects, they are closely related to the sulfur dyes.

The sulfur dyes, generally speaking, belong to that group of compounds having in common the thiazol-ring structure. While this is an efficient chromophore, it inherently possesses limited fastness properties characteristic of the sulfur dyes. The chemistry of the thionation process is still obscure and the products are complex in structure. Rarely are they definite chemical compounds, but rather aggregations of related substances. Authorities generally agree that the sulfur dyes contain the quinoid grouping which is capable of reversible oxidation and reduction and, in this respect, the chemical structure of the sulfur dyes is significantly similar to the vat dyes.

Research over the past few years has led to the development of new, improved sulfur dyes of the "Quinone Imine" type. These are superior in their fastness to chlorine, washing and light and, again, are closely related to the vat dyes. It is felt

*Presented on September 13, 1956 during the Perkin Centennial Celebration at the Waldorf Astoria, New York, NY

that some new and improved dyes of this type will soon be in commercial production. This type of dyestuff offers great promise toward overcoming the inherent weaknesses characteristic of conventional sulfur dyes of the thiazol-ring types. These bodies react readily with sulfur, yielding attractive shades of excellent fastness covering the range of black, blue, green and red brown. It is believed that the absence of loosely bonded sulfur or disulfide groups accounts for the excellent stability and fastness properties that these products offer.

The sulfur dyes are especially versatile in their application to cotton and other cellulosic fibers. It may be pointed out here that the sulfur dyes are generally faster to washing and light, and are brighter in shade when applied to rayon fabrics as compared to cotton. They are applied to the fibers in the form of raw stock, roving, yarn on packages or beams, or in warp form. They are also applied to piece goods by the jig, the pad-jig or various modifications of continuous methods of application. They are especially applicable on continuous steamer equipment since this method of application seems to enhance their fastness to both light and washing. They are not suitable for application in equipment for molten-metal type processing since the molten metal reacts with the sulfides in the dyebaths. The sulfur dyes may be reduced for application of sodium sulfide, sodium hydrosulfite, reducing sugars (such as dextrose, etc, and by combinations of these reducing agents. This adaptability toward the various reducing agents gives them much flexibility of application.

In the alkaline dyebath the sulfur dyes are in the reduced leuco form. After dyeing, they may be oxidized by various means and a wide range of oxidizing agents, including washing in cold water, exposure to the atmosphere, as well as the use of many chemical oxidation compounds, such as hydrogen peroxide, sodium perborate, ammonium persulfate, sodium bichromate and acetic acid, sodium bichromate in a neutral bath, etc. Shades are brightest though less fast to washing when oxidized with sodium perborate. Reasonable care should be exercised in chemical oxidation of fabrics dyed with the sulfur dyes since over-oxidation impairs the washfastness. In fact, it can be said generally that oxidation never improves the fastness to washing of sulfur dyes. It is employed only to produce quickly the ultimate and final shade. In this respect, oxidation with sodium perborate should be done with extreme care to avoid impairment of washfastness. This agent does develop the sulfur dyes to the brightest shade. Usually it can be said that the best and safest oxidizing agent to use is the one which oxidizes the reduced leuco compound to the normal oxidized state of the dyestuff and which avoids further destructive oxidation beyond that point.

Fastness to light on fabrics dyed with the sulfur dyes is sometimes improved by an aftertreatment with copper salts. Sulfur black dyeings should never be aftertreated with copper as this metal has a profound effect in catalyzing the decomposition of sulfur black, producing acid and consequent tendering of the fibers.

In the application of the sulfur dyes, care should be exercised to insure that the dyebath not be contaminated with calcium salts. If calcium salts are present in sulfur dyestuff dyebaths, they react with the sulfur dyes and form inert, insoluble calcium compounds which precipitate, and (especially in closed machines) form sludges which restrict the circulation of the dyebath and cause much trouble. Calcium salts in dyebaths may come from a number of sources, including the water used, the salt employed for exhausting, and especially from the cotton itself, which often contains calcium in and on the fibers. One should employ salt for exhausting which has a minimum calcium content. A preboilout with a bath containing some acetic acid and other reagents will remove much of the calcium from the cotton. The boil-out bath is then dropped and a fresh bath made up with a calcium sequestering agent.

The tendering of the fibers dyed with sulfur black and subsequently subjected to conditions which induce tendering, ie, humidity and high temperatures, is inhibited by an aftertreatment with certain organic amino compounds. It is generally considered that, of all the sulfur dyes, the conventional sulfur black (made from the thionation of di-nitro-phenol) is the only sulfur dye which inherently possesses properties which may lead to tendering. It is fortunate that this color, being the sulfur dye used in the largest tonnage, possesses the property of reacting and uniting with these amino compounds to form a more stable molecule which resists decomposition and the formation of tendering substances. These inhibiting amines and the technique of their application are readily available to the dyeing industry. Again, speaking specifically of the ordinary sulfur blacks (made from the thionation of di-nitro-phenol), they should not be employed on fabrics where fastness to chlorine is a prime requirement. In this respect, the indocarbon types—sometimes classified as vat dyes and sometimes classified as sulfur dyes—are quite superior to the ordinary sulfur blacks. In recent years, these superior blacks have been improved tremendously and are now available in the conventional powder form, in the paste form, and in the more modern ready-to-dye liquid solutions, from which deep black shades are easily and economically produced.

RECENT DEVELOPMENTS IN APPLICATION TECHNIQUES FOR DYEING WITH SULFUR DYESTUFFS

While the manufacturers have been extending the number and improving the quality of sulfur dyestuffs available to the dyer, methods of application also have been studied and new techniques and improvements in the old ones have been made.

PACKAGE DYEING——Some yarn dyers have been reluctant to use sulfur dyestuffs for first-quality work, and the stated reasons for this aversion have been:

1) Sulfur-dyed yarns are so harsh that they give trouble in subsequent operations such as quilling, knitting, etc.

2) It has not been possible to dye packages uniformly even in shade throughout.

The first of these objections has been pretty well overcome, thanks to the manufacturers of synthetic detergents and softeners. Part of this difficulty originates with deposits on the yarns of chromium compounds resulting from a sodium bichromate and acetic acid oxidation. Oxidation by cold water alone, with ammonium persulfate, or the addition of an ethylene oxide condensate type of detergent in the chrome bath all have helped materially in correcting the harshness that was due to the chromium compounds. However, there is a harshness which seems to be inherent with sulfur colors, and this may be corrected by the application of the self-emulsifying fatty esters either in the last operation in the dyeing ma-

chine or by application in winding. With the use of these synthetic detergents and softeners, yarns that can be knitted and dyed well are readily dyed with sulfur dyestuffs.

The second objection has not been overcome as completely as the first, but considerable progress has been made. The dyeing of high-quality work with the sulfur dyes on package-type machines is steadily increasing.

The reduced, liquid, ready-to-dye dyestuffs have contributed to this progress. A specific reduction formula for each dyestuff to give the best solubility and dyeing properties is used. A particular reduction for each dyestuff can be worked out much better by the dye manufacturer than by the dyer, and then filtration and clarification of these solutions may be made on each product as necessary to remove troublesome insolubles.

Recognition that calcium and other metallic salts produce, with dyestuffs, complexes that are less soluble, has led to pretreatment of the yarn, such as an acetic acid wash to remove these contributors to uneven dyeing from the yarn before dyeing. With the use of sequestering agents, such as tetra sodium pyrophosphate, Calgon, ethylene diamine tetra acetic acid, etc, the troubles from calcium insolubles which lead to heavy outsides and insides have been removed or at least reduced.

Sulfur dyestuffs are generally rapid in their rate of exhaustion, especially on mercerized yarn and on rayon, hence the use of retarding agents, such as the lignin sulfonates, has helped in level package dyeing. Starting the dyeing cycle at 100° F and gradually raising the temperature frequently gives more even results, and in many cases it is not necessary or desirable to exceed 140° F for a dyeing temperature.

So, while it is not possible to prescribe one given set of conditions for level dyeing of all sulfur colors, nor to guarantee that all shades can be dyed without some unevenness, their use in package dyeing is being extended with steadily improved results, and they offer possibilities of low costs in dark shades to the dyer who has the perseverance to work with them.

JIG DYEING———The most common trouble encountered with sulfur dyestuffs in jig dyeing is dark selvages. Of course, the uneven jig roll is the primary cause of these troubles, but various factors in the jig-dyeing operation may exaggerate or retard them. High alkalinity of the dyebath, lack of reduction, high temperature, and the presence of calcium all tend to aggravate this trouble. The same methods previously mentioned to remove or protect against calcium salts should be employed in jig-dyeing shades that are likely to produce dark or bronzy selvages. Ordinarily, the use of soft water and calcium-free salt are sufficient precautions; but in more severe cases either presouring of the fabric or the addition of a sequestering agent to the dyebath, or both, may be advisable.

It is surprising how many of the sulfur dyestuffs will give a full color yield at comparatively low temperatures. Many of the blues, which are generally the most troublesome, may be dyed as low as 110° F without loss of color yield or fastness to washing. The greens and browns dye well in the range of 120° F to 150° F. The blacks show the best yields at temperatures over 190° F, but, even so, the loss in depth is not disastrous at 160° F and even less, so if any particular shade is troublesome with respect to dark selvages, one of the first corrective measures is to lower the temperature of the dyebath.

Ammonium sulfate (sulfate of ammonia) has been employed for a good many years in jig dyeing with sulfur dyes. Its function is to reduce the alkalinity of the dyebath by the release of ammonia. In relatively high temperatures, ammonium sulfide and hydrogen sulfide are also released from the jig bath, which reducing gases more or less envelop the jig roll and counteract the oxygen around the ends of the rolls. This reduces the tendency toward oxidation and heavy selvages. A disadvantage of the use of ammonium sulfate is that the gases evolved are disagreeable and toxic. The loss of these reducing gases lowers the reduction concentration in the dyebath and brings about an increase of exhaustion often with resultant heavier shades. Sulfide compounds of lower alkalinity and higher reduction potential than ordinary sodium sulfide are available and these may be use advantageously in the jig bath to reduce selvage troubles. At present, therefore, the best recommendations for eliminating selvage troubles are to dye at lower temperatures, fortify the dyebath with high reduction-low alkalinity sulfide, avoid calcium, and give the least number of jig ends with the straightest roll possible.

BECK DYEING OF SULFUR COLORS———It has been generally assumed that sulfur dyestuffs could not be applied on beck or box machines because of the continued and repeated exposure to air which theoretically would destroy the reduction and result in blotchy uneven dyeings. Anyone who has made beaker dyeings with sulfur blues and observed the dark stains resulting when parts of the fabric were exposed to air was well justified in holding that opinion. Recently, some adventurous dyers, taking advantage of the knowledge that many sulfur dyes perform well at low temperatures, have experimented with them on dye becks, and have come up with some very good results. The principal innovations they have made in accomplishing these results are, first, low temperatures in the dyebath at 110° to 140°F, according to the shades, and the liberal use of low alkalinity-high reducing sulfides and a high concentration of calcium-free salt for exhaustion. After dyeing, a very good cold-water wash has been used before oxidation. In this fashion, some very excellent and level dyeings of browns, greens, blues and blacks are being done.

CONTINUOUS PIECE GOODS DYEING———For many years, the accepted method of continuous sulfur dyeing was to use a dye box of sufficiently large volume so that a considerable time of immersion was possible in the dyebath. This was economical only for long runs, since the volume of dye necessarily lost at the end of each run was great and therefore costly. With the introduction of Williams Units and pad-steam equipment, both have been accepted for continuous dyeing of sulfur dyes. In the Williams Unit, the advantage of a longer immersion time without a large or costly volume of reduced dyestuff is had. But since the sulfur colors have relatively rapid rates of exhaustion, the problem of adjusting feed mixes to hold a given shade is still troublesome when combinations of two or more dyes with considerable differences in exhaustion rate are employed. Nevertheless, satisfactory work is being done continuously with Williams Units.

Pad-steam equipment has fitted right into the sulfur dyeing operation, and is now being used more extensively for continuous dyeing of sulfur colors than any other equipment. For many shades, the process is quite simple. Just pad the reduced sulfur dyestuff, steam, wash, oxidize and wash. By padding at low temperatures (80 to 100°F) and with a short immersion time, the feed-up problem is not as great as with higher temperatures

and longer immersion times. However, it is well to note that even with low temperatures and short immersion times, adjustments from the starting to the feed mix are necessary, again confirming that there is considerable exhaustion with sulfur dyestuffs even at low temperatures. The higher concentrations possible with the reduced, ready-to-dye sulfur colors allow even the darkest of shades to be dyed by the pad-steam process.

In many fabrics, particularly those tightly woven, such as broadcloths, poplins, twills, etc, a straight pad-steam dyeing may result in a motley or mealy, or by any other wording, an unattractive surface appearance. To correct this, sulfur dyers have taken a page from the vat dyer's book and dried the cloth after the first padding with the reduced sulfur color, and generally in an air drier so that it will not scrimp. Continuously, after drying, the fabric is padded with a solution of the low alkalinity-high reducing sulfide, and then passed through the steamer, followed by the usual washing, oxidation and subsequent washing. In some shades, there may be a 10% loss in color value by this method, but the difference in appearance in many fabrics is the difference between a fabric that is marketable and one that is not.

SULFUR DEPOSITS——Occasionally, in both jig and continuous dyeing with sulfur dyestuffs, deposits of free sulfur are found in the dyed fabric which appear as a surface frostiness or sometimes as sparkling crystals. The presence of free sulfur is readily identified by pressing the stained area with a hot iron. The odor of sulfur is unmistakable, and sulfur sublimes and the stain disappears. This condition may readily be avoided or corrected. In fabrics where a high concentration of sulfide has been used in the dyebath, obviously extra washing before oxidizing is needed, and this followed by a treatment with 1% sodium sulfite solution at 140°F before oxidation will remove the hazard of sulfur deposits. The effect of sodium sulfite depends on the combining of sulfur and sodium sulfite to form sodium thiosulfate, which is quite soluble in water. For jigs, two ends in this solution are sufficient, and in continuous dyeing one box is enough. Following this same process, sulfur deposits, once on the cloth, can be removed with sodium sulfite and a little longer time in solution and a higher temperature or a higher concentration may be necessary to remove it once deposited.

PRINTING——There are references in literature dating back many years to the use of sulfur colors for printing, but only sporadic work in printing has been done with them. The fundamental trouble has been the etching of copper print rolls by the sulfur and sulfur compounds that are present.

Chrome-plated rollers do resist the action of corrosive sulfur, but if a scratch through the chrome is made, then the roll must be replated after repairing and before using sulfur colors again.

One approach to the solution of this problem is to print from a water-in-oil emulsion, such as may be made from ethyl cellulose. In this case, the reduced sulfur color is present in the dispersed water phase, and is kept from the copper roll by the continuous oil phase of the emulsion. This works fairly well insofar as avoiding corrosion, but the character of the emulsion affects the depth and tone of the color obtained, and small differences in the emulsion caused greater differences in shade than are normally tolerated in printing.

A more direct approach has been made, and that is to remove all the free sulfur and corrosive compounds from the sulfur dyestuff. The sulfur, which is organic in the dyestuff itself, is not troublesome. Methods have been developed and applied recently in the manufacture which practically remove all the sulfur compounds that corrode copper. This purified unreduced sulfur dyestuff is then made into a dispersion of fine particle size suitable for printing. While some of these sulfur dye printing pastes may be printed with a carbonate and sodium sulfoxylate, the best results are obtained with a glucose-carbonate reduction. Low-cost blacks, blues, greens and browns are all being printed in steadily increasing quantity today without damage to the chrome-plated rollers. In addition to low costs, the fact that they are printed from a glucose reduction makes them particularly useful on dyed grounds made with either naphthol combinations or diazotized and developed colors. For blacks, dark browns, and navies, they are simply overprinted and do not discharge the ground, therefore, no unsightly halo around the dark objects. The aging oxidation and soaping of fabrics printed with this glucose formulation for sulfur dyes is identical with these processes used for vat-printed fabrics.

OLNEY MEDAL AWARD CANDIDATES

THE Olney Medal Award Committee invites Senior members of AATCC to nominate candidates for the 1957 Olney Medal.

The medal is awarded for outstanding achievement in the field of textile chemistry including the development of chemical agents or chemical processes used in the manufacture of textiles, or methods of their evaluation. Its purposes are to encourage and afford public recognition to such achievements and contributions and to be a testimonial to Dr Louis Atwell Olney in recognition of his lifetime of devotion and multitudinous contributions to this field.

Nominations should set forth in detail all facts which qualify the candidate of consideration, with particular reference to published works and professional qualifications.

Previous winners of the Olney Medal are: Milton Harris, William H Cady, Edward R Schwarz, Harold M Chase, Charles A Seibert, George L Royer, Raymond W Jacoby, Werner von Bergen, Roland E Derby, William D Appel, Miles A Dahlen and Walter J Hamburger.

The voting members of the committee on awards are Walter M Scott, *chairman;* Percival Theel; Paul L Meunier; Edward W Lawrence; President George O Linberg, *ex officio.*

Nominating letters and complete data should be in the hands of the committee by March 1, 1957. Please address to G P Paine, secretary, Olney Medal Committee, AATCC, Box 28, Lowell, Mass.

1955 National Convention———

THE INTERACTION OF CELLULOSE WITH SIMPLE SALT SOLUTIONS AND WITH DYEBATHS*

MARY MONCRIEFF-YEATES[1] and HOWARD J WHITE, JR

Textile Research Institute
Princeton, NJ

Radioactive tracer techniques have been used to study the absorption of various ions by cellulose from salt solutions and from dyebaths. Measurements have been made on the absorption of Na and SO_4 ions from Na_2SO_4 solutions at 25°C and at 90°C and from Na_2SO_4 solutions containing a direct dye at 90°C. Measurements of the amount of dye absorbed were made using conventional techniques. The absorption of Br from NaBr solutions was also studied.

The results on the absorption of ions from simple salt solutions can be interpreted qualitatively in terms of a simple Donnan equilibrium. The results on the absorption of ions in the presence of dye cannot be interpreted in terms of a Donnan equilibrium as modified by a Langmuir-type dye absorption. Electrostatic interaction between absorbed dye anions is advanced as a possible reason for the discrepancy.

In the course of the work some results have been obtained on the stability of the viscose rayon sample used and the cation-exchange capacity of the cellulose was measured.

INTRODUCTION

THE purpose of this paper is the presentation of work on the interaction of cellulosic fibers with simple salt solutions and with dyebaths.

The interaction of cellulosic fibers with dyebaths has often been studied because of its technological importance. The interaction of such fibers with salt solutions has been less often studied, but is, nonetheless, of interest and importance. In the first place, dyes for cellulose are often salts and simple salts are often components of dyebaths for cellulose. In the second place, since the behavior of simple salt solutions is better understood than the behavior of dyebaths, it is reasonable to expect that the interaction of such solutions with cellulosic fibers will be simpler and more susceptible to ready interpretation than the interaction of the same fibers with dyebaths. Cellulosic fibers were chosen because they are representative of an important technological class of fibers, and because large, moderately round fibers, which offer advantages for the experimental technique used, were readily available.

The rather extensive literature on the absorption of dyes, especially direct dyes, by cellulose has been reviewed by Vickerstaff (*1*). Vickerstaff has also reviewed the literature on salt absorption; however, three papers might be mentioned as pertinent to the work presented here, namely, those of Usher and Wahbi (*2*), Neale and Standring (*3*), and Farrar and Neale (*4*), and particularly the last.

The experiments reported here were formulated with the intention of uncovering, in as much detail as possible, the environment existing within a cellulosic fiber which is in contact with an ionic aqueous phase. Measurements were made at room temperature (~25°C) and at 90°C. The salt used most extensively was Na_2SO_4 and measurements were made on the uptake of both cation and anion as a function of the concentration of the bath at 25°C and 90°C and as a function of pH at 25°C. In addition, the uptake of the direct dye, Chrysophenine G, and the effect of the dye on the salt uptake were studied at 90°C. It was also necessary to perform some measurements relating to the stability of the fibers. Finally some measurements were made on the uptake of the Br ion from NaBr solutions.

All of the salt absorption measurements were made using radioactive tracer techniques; dye uptakes were measured by a change-of-concentration method. Details of each method are given below.

EXPERIMENTAL METHODS

Essentially three different measurements were made: room temperature ion absorption measurements, high temperature ion absorption measurements, and dye absorption measurements. Both high and room temperature salt absorption measurements were made using single fiber samples and radioactive salts; the dye absorption measurements were made using bulk samples.

The use of radioactive tracers offers two advantages: the distribution of individual ions can be determined, and sufficiently small quantities can be measured that single fiber samples can be used. The use of single fibers minimizes the problem of the separation of the fiber sample from entrained solution, which is formidable when bulk samples are used.

Preparation of Materials

FIBER SAMPLES———The fiber samples used were viscose rayon monofils. They had smooth, approximately round cross-sections, and each filament had a mass-length ratio of roughly 15 denier. The fibers are made by the American Viscose Corporation and marketed under the name Tufton.

Fibers 10 cm long were extracted in a Soxhlet Extractor for 1 hr with thiophene-free benzene and air dried. They were then soaked in distilled water which was adjusted to pH 5 with HCl; the water was changed frequently and the soaking was continued until the pH of the water remained constant. This treatment was carried out in an effort to assure that all exchangeable cations within the fiber were hydrogen ions at the start of the experiment.

The fibers can be separated into two groups with respect to preparatory treatment at this point. Some of them were soaked in distilled water for 8 hrs. Others were washed 3 times with distilled water, soaked in distilled water at 90°C for 1 hr, and finally soaked in distilled water for 8 hrs at room temperature. This last set of fibers will be referred to, hereafter, as stabilized; the changes brought about by the stabilization process and the reasons for its use will be discussed subsequently.

All of the fibers were then blotted, dried at 85°C for 2 hrs (or until all apparent water was removed), and finally dried *in vacuo* over $Mg(ClO_4)_2$ overnight.

---

* Presented in part on September 22, 1955 at the Viking Room, Haddon Hall Hotel, Atlantic City, NJ, during the 1955 National Convention.

[1] Present address: 2542 Clarke St, Fullerton, Calif.

The samples were then conditioned for at least 24 hrs at 65% RH and 70°C and weighed using a vibroscope (5). The dry weights were determined from the weights at 65% RH by calculation; the amount of water taken up, 13.4 g/100 g dry fiber, was determined by direct measurement with a bulk sample. It is probable that there are fiber-to-fiber variations in the amount of water absorbed, and that the stabilized fibers have a slightly lower absorptive capacity than the unstabilized fibers. Error from such sources should be about 1%, which is well within the limits of precision of the experiments. It should also be mentioned that the samples were small (a few hundred fibers) and, hence, did not need the long conditioning times necessary with larger bulk samples.

SALT SOLUTIONS——The radioactive isotopes used were Na^{22}, Br^{82} and S^{35}, which were obtained from Oak Ridge National Laboratory with permission of the Atomic Energy Commission. They were obtained in the form of simple acids or salts and were converted to the desired form by standard methods, such as the use of ion-exchange columns and titration. The salts $NaBr^{82}$, $Na_2{}^{22}SO_4$ and $Na_2S^{35}O_4$ were prepared.

DYE SOLUTIONS——The direct dye, Chrysophenine G (*Colour Index* Number 365), was used and was purified by repeated salting out with CH_3COONa.

Salt Absorption Measurements at Room Temperature

The room temperature measurements were made using a modification of the method of Stam and White (6). It can be conveniently broken down into 4 operations: treatment, washing, counting and calibration.

TREATMENT——The fibers were attached to stainless-steel spring clips and treated in test tubes or centrifuge tubes. 3 to 5 fibers were treated at a time in about 20 ml of solution, so that there was a negligible change in concentration of the bath during any one treatment. The fibers were separated, one from the other, by a device consisting of glass tubes spaced out from and attached to a central glass rod; this device minimized entanglement of the fibers. The solutions were agitated sporadically by hand.

WASHING——The washing step is designed to separate surface droplets from material that has penetrated within the fibers. One of the reasons

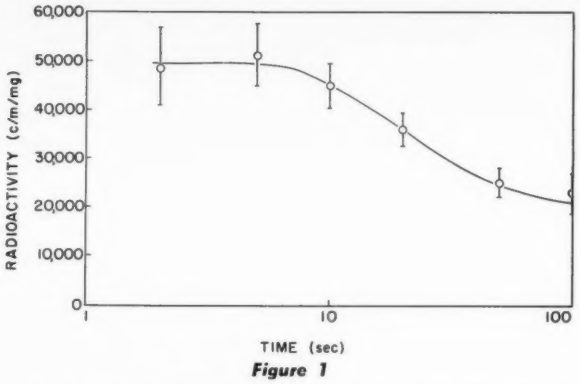


Figure 1

The rate of desorption of $S^{35}O_4$ from Na_2SO_4-treated monofils into a 75% ethanol/25% water bath at room temperature. The amount of $S^{35}O_4$ in the monofils is specified in terms of its radioactivity.

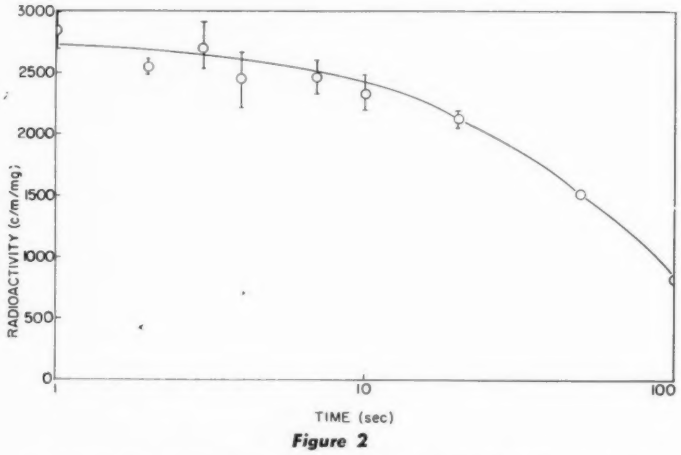


Figure 2

The rate of desorption of Na^{22} from Na_2SO_4-treated viscose monofils into a 75% ethanol/25% water bath at room temperature. The amount of Na^{22} in the monofils is specified in terms of its radioactivity.

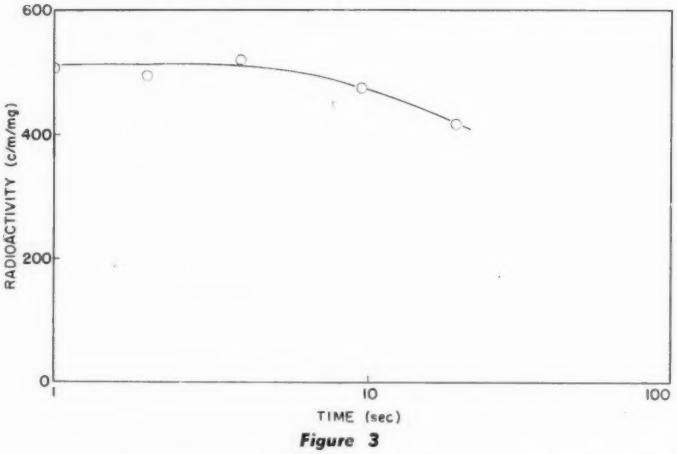


Figure 3

The rate of desorption of Br^{82} from NaBr-treated viscose monofils into a 95% ethanol bath. The amount of Br^{82} in the monofils is specified in terms of its radioactivity.

for using single fiber samples is the simplification of this separation, which is, in general, the most difficult part of any experiment involving absorption by fibers.

Washing consists of two processes: removal of material from the surface of the fiber and removal of material from the interior of the fiber. In a successful washing, conditions are so adjusted that the first process is effectively complete before the second starts, and the washing is broken off in the interval between.

Curves for the rate of removal of the various radioactive ions by satisfactory wash liquids are shown in Figures 1-3. The units of the ordinates in Figures 1-3 are units of radioactivity and are related to the amount absorbed in a way that will be discussed later. The limits in Figures 1-3 represent standard deviations.

It is clear that, for a successful washing (as defined above), a complete plot of the desorption in the manner of Figure 1 would consist of two steps; the first representing removal of surface material, the second removal of material from the interior. The latter process is obviously the slower. The existence of only one step in Figures 1-3 means either that the two processes have been separated, the first occurring in the experimentally unattainable region to the left of the ordinate, or that both occur simultaneously at a moderately slow rate. However, for completely unwashed fibers there is more radioactive material present, the experiments show poor reproducibility, and crystals of salt may be seen on the surface of the dried fiber with a microscope. Washed fibers have no salt crystals on their surfaces and give much more reproducible results. Thus it may be inferred that the two processes have been separated and the washing has been successful. On the basis of the above reasoning the liquids used in Figures 1-3 have been termed satisfactory wash liquids.

As far as procedure is concerned, the fibers were removed from the treating bath, shaken to remove excess droplets, washed for a few seconds, and mounted. A solution of 75% ethanol 25% water was used with $Na_2{}^{22}SO_4$ and $Na_2S^{35}O_4$; 95% ethanol was used with $NaBr^{82}$.

COUNTING———The fibers were mounted in a loose spiral on tantalum discs using albumen fixative to hold them to the discs. The discs were then heated to harden the albumen and remove water. The samples were counted with an internal flow counter.

CALIBRATION———It is necessary to equate units of radioactivity with units expressing amount absorbed. In general, the chemical composition of a radioactive solution was determined by standard chemical methods; an aliquot of the solution was prepared for counting and its radioactivity was compared with the radioactivity of the treated fibers. Since great attention must be paid to details in this calibration process it is convenient to consider the calibration for each isotope separately.

$Na_2S^{35}O_4$———The calibration factor has been determined as the composite of two factors. For the first factor 1 ml of a standard solution was dried on an albumen-coated tantalum disc, and the disc was counted. The average coating of salt on the disc was much less than 1 mg/cm². A fiber was then placed on the disc and dissolved with concentrated HNO_3 solution, and the disc was dried and again counted. The first factor is the ratio of the first count to the second. A value of 1.12 with a coefficient of variation of the mean of 1.2% was obtained from 11 determinations.

The second factor was obtained by mounting radioactive fibers, counting them, dissolving them with a concentrated HNO_3 solution, and drying and counting the disc on which the fiber was dissolved. The second factor is the ratio of the second count to the first. An average of 11 determinations was 1.45 with a coefficient of variation of the mean of 1.4%.

Combination of the two factors gives an over-all calibration factor of 1.63. Thus the radioactivity of a coiled fiber must be multiplied by 1.63 to convert it to the equivalent radioactivity for an aliquot of a standard solution.

$Na_2{}^{22}SO_4$———The same method was used to determine the calibration factor for $Na_2{}^{22}SO_4$. The two factors determined were 1.043 and 0.968 respectively. The second factor is less than unity, implying that more of the radioactivity reaches the counter when the fiber is intact than after it has been dissolved. This result is not impossible because of the probability of different geometrical factors in the two cases, but it was unexpected. Since the coefficient of variation of the mean (for 14 fibers) was 0.8%, and a careful check disclosed no possibility for a loss of radioactivity through volatilization or spattering, the factor was accepted.

Combination of the two factors gives an over-all calibration factor of 1.01.

$NaBr^{82}$———It is evident that dissolution of the fiber with HNO_3 cannot be used in this case because of the volatility of HBr. Dissolution of the fibers with tetramethyl ammonium hydroxide and heat also failed because of loss of volatile radioactive material. As a result a leaching technique was used.

Each fiber was washed and then leached for 2 hrs or more in 2 ml of 0.001M NaBr solution; 1 ml of this solution was then transferred to a stainless steel disc, dried and counted. The concentration of the leaching solution was chosen so that the average thickness of the salt deposit on the stainless steel disc was less than 1 mg/cm². The radioactivities so determined were compared with the radioactivities of mounted samples.

The calibration factor was determined to be 1.085 with a coefficient of variation of the mean of 1.5%.

Salt Absorption Measurements at 90°C

The measurements at 90°C differed from those at room temperature only with respect to treatment and washing.

TREATMENT———The temperature was maintained to within ±0.1°C with standard equipment. Many of the measurements at 90°C involved dyebaths and in every case the fiber-to-bath ratio was such that exhaustion of the dyebath was negligible.

The method of treatment was the same for 90°C and room temperature except that the precision of the measurements at 90°C was considerably improved if the fibers were preconditioned for 1 hr or more in air which had been bubbled through water. Why such a preconditioning treatment should be effective is obscure; certainly the treating bath contains an excess of water. One possible explanation is the following. Minute occluded air bubbles may be present at the fiber-liquid interface; these can serve as nuclei for drop entrainment when the fiber is removed from the liquid, and thus increase the amount of material which must be washed off, and in this way, the error in washing. Presumably, then, exposure of the fiber to a high relative humidity brings about the adsorption of a surface layer of water on the fiber, and this layer minimizes the occlusion of air bubbles when the fiber is put into the bath.

A time of treatment of 30 min was used. Preliminary experiments showed that no rapid changes took place after 30 min, although slow changes, thought to result from

changes in properties of the fiber, occurred more or less continuously. The time chosen was selected as the best compromise between essentially complete absorption and minimum chemical or physical change.

WASHING —— The fibers were removed from the 90°C bath and immediately immersed in ice-cold 95% ethanol. They were then washed immediately in 75% ethanol at room temperature. The purpose of the first bath was to reduce the temperature and slow down diffusion as quickly as possible; Na_2SO_4 is practically insoluble in 95% ethanol. Using this technique the uptake results for 90°C were found to have an average coefficient of variation of less than 10% which is only slightly worse than was obtained at room temperature (~7%). Immersion of the fibers directly in a cold 75% ethanol bath led to a greater scatter of results.

From consideration of the rate of diffusion of salt out of the fiber, as shown in Figures 1-3, and the increase in rate accompanying an increase in temperature, it is evident that washing at 90°C is out of the question for experimental reasons. The fiber must be washed at room temperature, and the cooling must be done as quickly as possible to avoid changes in the equilibrium between the interior and the surface of the fiber resulting from such effects as evaporation of water from the surface droplets. The reproducibility of the washing process outlined above was considerably better than the reproducibilities of other processes involving variations in washing method or no washing at all. This fact suggests that the method used is either a satisfactory method or incorporates a uniform systematic error. However, it should be emphasized that no direct justification of the washing process for high temperature absorption is available.

Dye Absorption Measurements

The absorption of dye was determined from the change in concentration of the dyebath during the dyeing process, which was measured spectrophotometrically. Because of the phototropic character of the dye, each solution was illuminated for 10 min with a 100-watt bulb at a distance of 6 in through 2 in of water. The results obtained in this way were found to be more precise than those obtained using a 10-min illumination at a distance of 1 in, which was used by previous workers (7). These latter conditions were shown to cause heating of the solution, which was thought to be a source of error.

Most of the measurements were made using sealed vessels with occasional swirling but no systematic stirring. In some cases measurements were made in open vessels equipped with stirrers and condensers. The differences between the methods fell within the experimental error. In every case preliminary checks were made to assure that the times allowed were adequate for equilibrium.

RESULTS

Results With Dye Absent

Results on the equilibrium absorption of SO_4 and Na from Na_2SO_4 solutions are given in Table I and Table II respectively. Uptake values are given as a function of bath concentration for both temperatures and for both stabilized and unstabilized fibers. The uptakes are reported in equivalent units; in other words, the uptake of Na is reported in units of Na_2. The average relative coefficient of variation of the uptake values in Tables I and II is 6.6%.

Various aspects of the results in Tables I and II are shown in Figures 4-6. Figure 4 shows the effect of the stabilizing treatment and Figure 5 the effect of temperature on the uptake of Na and SO_4. In Figure 6 the absorption results for the unstabilized fiber at 25°C are plotted on a log-log basis to cover the entire range of concentration. Results on the uptake of Br from NaBr solutions are also included. These results are also given in Table III.

Results are given in Tables IV and V and in Figure 7 on the effect of pH on the uptake of Na and SO_4 from Na_2SO_4 solutions by stabilized fibers.

Strictly speaking the two sets of results were obtained for solutions differing slightly in concentration; however, in view of the coefficients of variation of the results the difference is unimportant.

Rate-of-absorption curves for SO_4 and Na from Na_2SO_4 solutions and Br from NaBr solutions are given in Figures 8-10. These curves are shown to indicate orders of magnitude rather than as quantitative results. In particular, the difference between the curves in Figure 8 and Figure 9 is too great to be accounted for by a rapid cation exchange, and probably falls within the error of the measurements.

Results With Dye Present

A set of experiments was run in which the absorption of SO_4 from solutions containing varying amounts of dye and of Na_2SO_4 by stabilized fibers at 90°C was measured. The results are given in Table VI and Figure 11.

In Figure 11 the solid line represents the results obtained when no dye is present. The dotted lines are theoretical predictions which will be discussed later.

In Table VII and Figure 12 results on the uptake of Chrysophenine G by the viscose monofil used are given.

Finally results on the dye and SO_4 uptake over a range of concentrations of dye and salt in the solution are given in Table VIII. These results are interpolated from the results previously given. The last column of the table will be discussed later in this paper.

TABLE I
Uptake of SO_4 by Viscose Rayon from Na_2SO_4 Solutions

Condition of Sample	Temperature (°C)	Equilibrium conc of bath (M/1000g water)	(M/L)	Uptake (mM/g)
Unstabilized	~25	.0051	.0051	.00203
		.0102	.0102	.00489
		.0205	.0205	.0121
		.0349	.0349	.0233
		.0772	.0772	.0508
		.123	.123	.105
		.432	.422	.381
		.766	.754	.668
		.991	.972	.803
		1.21	1.18	.929
		1.56	1.51	1.38
Stabilized	~25	.0120	.0120	.00530
		.0126	.0126	.00588
		.0170	.0170	.00756
		.0193	.0193	.0103
		.0246	.0246	.0127
		.0302	.0302	.0148
		.0310	.0310	.0157
		.0369	.0369	.0203
Stabilized	90	.0126		.00407
		.0159		.00517
		.0170		.00603
		.0193		.00742
		.0208		.00808
		.0246		.00941
		.0279		.0120
		.0311		.0128
		.0369		.0163

TABLE II
Uptake of Na_2 by Viscose Rayon from Na_2SO_4 Solutions

Condition of Sample	Temperature (°C)	Equilibrium conc of bath (M/1000g water)	(M/L)	Uptake (mM/g)
Unstabilized	~25	.0025	.0025	.0113
		.0050	.0050	.0147
		.0101	.0101	.0194
		.0151	.0151	.0230
		.0169	.0169	.0236
		.0424	.0424	.0441
		.0753	.0753	.0789
		.118	.118	.111
		.160	.159	.159
		.411	.407	.370
		.842	.830	.693
		.970	.952	.768
		1.31	1.27	.996
		1.93	1.83	1.32
Stabilized	~25	.0103	.0103	.0192
		.0168	.0168	.0242
		.0240	.0240	.0310
		.0307	.0307	.0354
Stabilized	90	.0105		.0204
		.0173		.0244
		.0249		.0310
		.0327		.0339

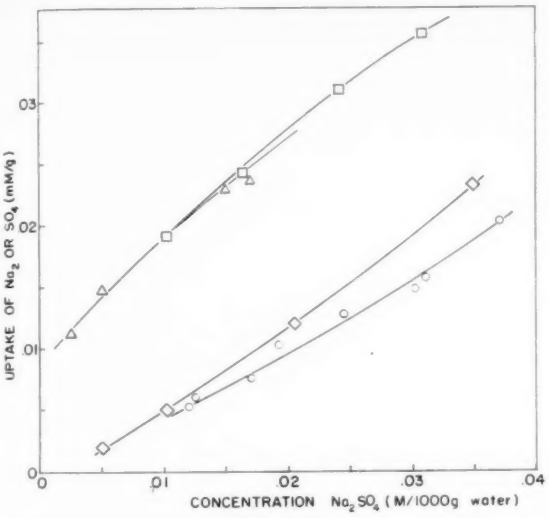


Figure 4

The uptake of Na_2 and SO_4 from Na_2SO_4 solutions by stabilized and unstabilized viscose monofils at room temperature.

△ Na_2 unstabilized
□ Na_2 stabilized
◇ SO_4 unstabilized
○ SO_4 stabilized

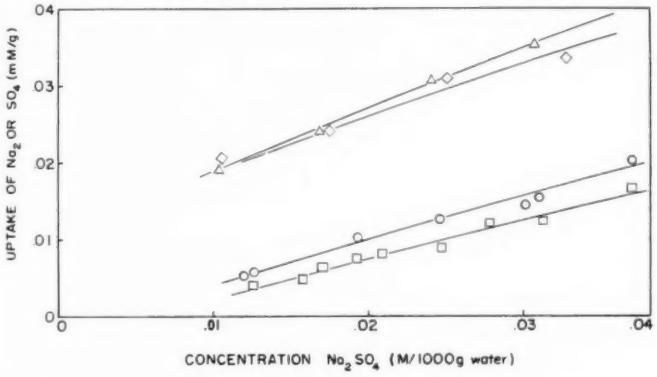


Figure 5

The uptake of Na_2 and SO_4 from Na_2SO_4 solutions by stabilized viscose monofils as a function of temperature.

△ Na_2 25°C
◇ Na_2 90°C
○ SO_4 25°C
□ SO_4 90°C

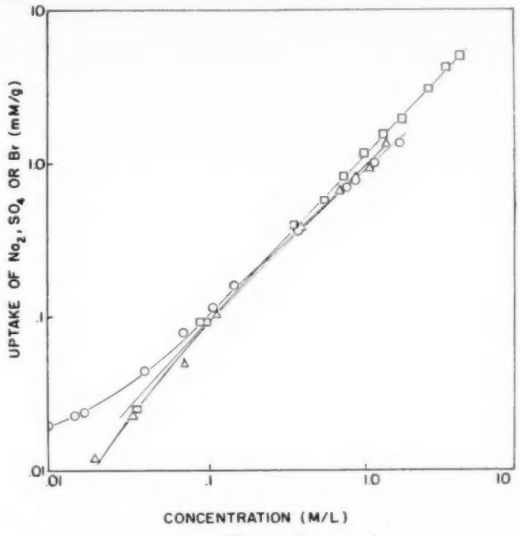


Figure 6

The uptake of Na_2 and SO_4 from Na_2SO_4 solutions and of Br from NaBr solutions by unstabilized viscose monofils.

○ Na_2
△ SO_4
□ Br

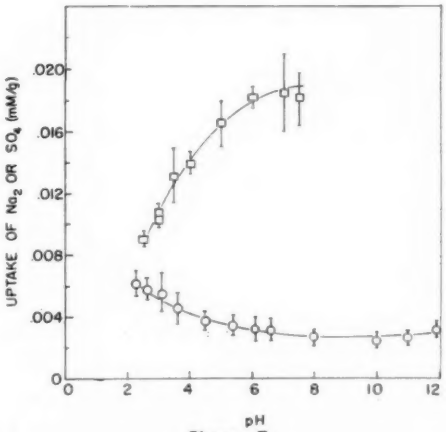


Figure 7

The uptake of Na_2 and SO_4 from Na_2SO_4 solutions by stabilized viscose monofils as a function of pH.

□ Na_2
○ SO_4

TABLE III

The Absorption of Br from NaBr Solutions by Unstabilized Viscose Monofil at ~25°C

Equilibrium Conc of bath (M/L)	*Uptake (mM/g fiber)*
.0369	.0256
.0965	.0943
.108	.0922
.386	.383
.611	.570
.814	.838
1.09	1.18
1.45	1.53
1.93	1.99
2.83	3.05
3.66	4.13
4.52	4.95

TABLE IV

Uptake of SO_4 from Na_2SO_4 Solutions by Stabilized Viscose Monofil at ~25°C as a Function of pH (Na_2SO_4 Concentration in Solution 0.0096M)

pH of solution	*Uptake (mM/g)*	*Coefficient of variation (%)*
2.25	6.23×10^{-3}	5.8
2.62	5.90	6.7
3.1	5.52	12.1
3.6	4.62	11.6
4.5	3.80	7.9
5.4	3.49	10.3
6.1	3.23	12.7
6.6	3.20	11.3
8.0	2.69	9.9
10.0	2.47	7.5
11.0	2.62	10.5
11.9	3.27	13.1

TABLE V

Uptake of Na_2 from Na_2SO_4 Solutions by Stabilized Viscose Monofil at ~25°C as a Function of pH (Na_2SO_4 Concentration in Solution 0.0098M)

pH of solution	*Uptake (mM/g)*	*Coefficient of variation (%)*
2.5	9.1×10^{-3}	6.4
3.0	10.4	6.3
3.0	10.7	8.7
3.5	13.2	13.8
4.0	14.0	4.9
5.0	16.6	9.1
6.0	18.3	3.0
7.0	18.5	14.3
7.5	18.1	9.4

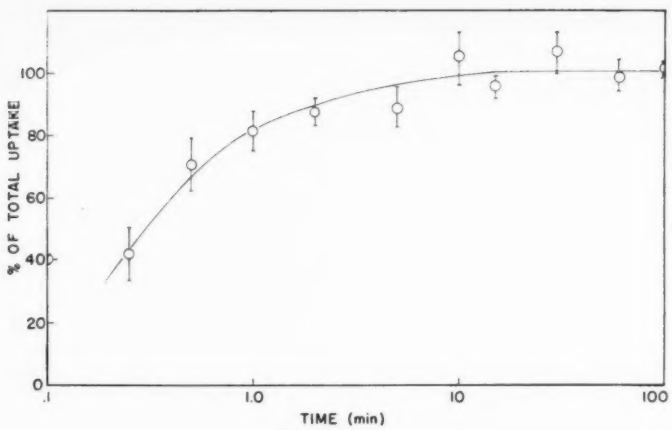


Figure 8

Rate of uptake of SO_4 from 0.97M Na_2SO_4 solution by unstabilized viscose monofils.

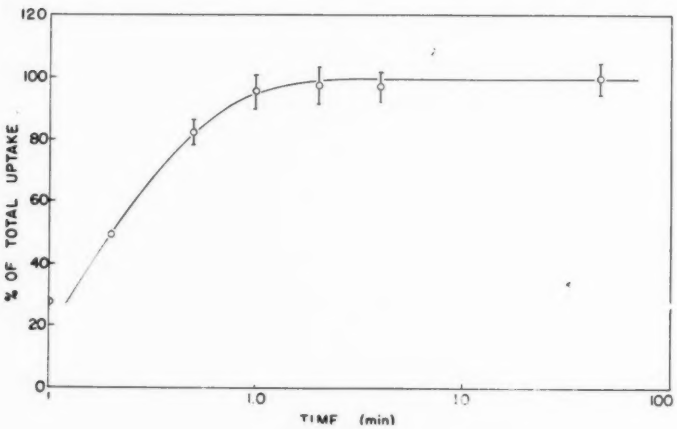


Figure 9

Rate of uptake of Na from 0.95M Na_2SO_4 solution by unstabilized viscose monofils.

TABLE VI

Uptake of SO_4 at 90°C from Solutions Containing Na_2SO_4 and Chrysophenine G

Conc dye mM/1000g water (mol wt 680)	*Conc salt M/1000g water (mol wt 142)*	*Dye/salt ratio*	*Uptake of SO_4 in mM/g fiber*	*Coefficient of variation (%)*
0.290	0.0449	0.00645	0.0186	8.0
.233	.0362		.0126	7.4
.170	.0262		.00875	5.1
.122	.0189		.00623	5.7
.347	.0321	.0108	.0118	5.6
.255	.236		.00804	6.6
.214	.0198		.00663	1.8
.171	.0158		.00482	3.4
.121	.0112		.00193	4.9
.062	.0057		.00101	13.
.606	.0326	.0186	.0113	5.1
.506	.0272		.00986	12.
.430	.0231		.00680	5.5
.392	.0211		.00636	18.
.324	.0174		.00491	7.3
1.04	.0446	.0234	.0175	12.
.798	.0341		.0124	15.
.559	.0239		.00799	11.
.400	.0171		.00503	9.1
.288	.0123		.00318	12.
1.08	.0295	.0367	.00877	16.
.954	.0260		.00811	14.
.837	.0228		.00741	8.6
.653	.0178		.00522	10.
.481	.0131		.00353	8.0
.282	.00769		.00147	11.

TABLE VII

The Uptake of Chrysophenine G by Viscose at 90°C as a Function of Dye and Salt Concentration

Condition	*Time of dyeing (hrs)*	*Salt conc (M/1000g water)*	*Equil dye conc (M/1000g water x10⁴)*	*Dye uptake in mM/g fiber x10*
No stirring	3	0.031	0.424	2.40
			.424	2.38
			.893	4.06
			.888	4.08
			1.42	5.44
			1.40	5.52
			1.94	6.12
			1.95	6.07
			2.11	6.98
			2.15	7.01
			3.02	8.69
			2.97	8.78
			3.91	10.75
			3.91	10.75
Stirring	2¼		0.986	4.51
No stirring	3	0.019	1.38	3.56
			1.36	3.73
			2.47	4.69
			2.44	4.84
	6		3.32	5.66
			3.21	6.17
			4.44	7.23
			4.69	6.92
Stirring	2¼		2.28	5.45
			1.66	4.54
			1.08	3.51
			0.811	2.62
No stirring	3	0.00985	1.27	2.17
			1.29	2.08
	6		2.61	3.96
			2.61	3.97
			2.67	3.58
			2.68	3.38
			3.68	3.72
			3.66	3.86
			5.34	5.11
			5.49	4.20
			5.51	4.09

DISCUSSION

Stability

Before discussing the mechanism of salt aborption by viscose fibers, it is perhaps desirable to consider the stability of the viscose monofils used.

It was originally found that the absorptive capacity for SO_4 ions at room temperature decreased spontaneously with time. It was learned that differences in dyeing resulting from differences in aging had been encountered, and the manufacturer stated that a treatment with steam or hot water successfully minimized such differences. This information was the source of what has been called the stabilizing treatment. Presumably treatment with hot water accelerates the aging process.

An examination of Figure 4 shows that the stabilization results in a decrease in anion-absorptive capacity and no change in the cation-absorptive capacity. This means a net increase ni the cation-exchange capacity.

Such results could ensue from either of two causes. First, there might exist anion exchange sites within the fiber which would be destroyed by treatment with hot water. Second, crystal-

lization or ordering of the cellulosic chains might occur under the influence of the hot water. If this ordering should be accompanied by the formation of new cation-exchange sites in such a way that the net absorptive capacity for cations remained roughly constant, the observed results would be obtained.

Of the two possibilities mentioned, the second seems the more probable although it is the more complicated. Crystallization in hot water is known to occur for some cellulosic fibers, and new cation-exchange sites could result either from oxidation or from removal of cations such as Zn or Ca which are present in spinning baths and are very hard to remove completely from the fiber during purification. On the other hand, no suitable anion-exchange sites have been found in cellulose.

It might be mentioned that the slight increase in cation-exchange capacity shown in Figure 5 suggests that the stabilization may not be complete. It is well known that extended treatment with hot water, particularly in the presence of air, produces profound changes in the properties of cellulosic materials.

Absorption of Ions in the Absence of Dye

CATION-EXCHANGE CAPACITY ———The cation-exchange capacity of the cellulose has already been mentioned in discussing the stability of the sample. It is evident that the curves for each ion in Figure 4 must start from the origin, separate gradually until the Na concentration becomes so large that the ionizable hydrogens have all been removed and then follow parallel courses. The separation between the parallel curves is a measure of the exchangeable cations, probably primarily the H ion from carboxylic acid groups. The experimental results appear to run together at high salt concentrations, as can be seen from Tables I and II. However, at the high concentrations the amount of each ion absorbed is such that the cation-exchange capacity falls within the experimental error.

The content of exchangeable cations is 0.031mE/g for the unstabilized material and 0.039mE/g for the stabilized fibers. These results are comparable in magnitude with values obtained in other ways. For example, Ant-Wuorinen (8) found a value of 0.038mE/g for a viscose rayon (DP 730) by a titration method, and Farrar and Neale (4) found a value of 0.048mE/g for a cellophane also by

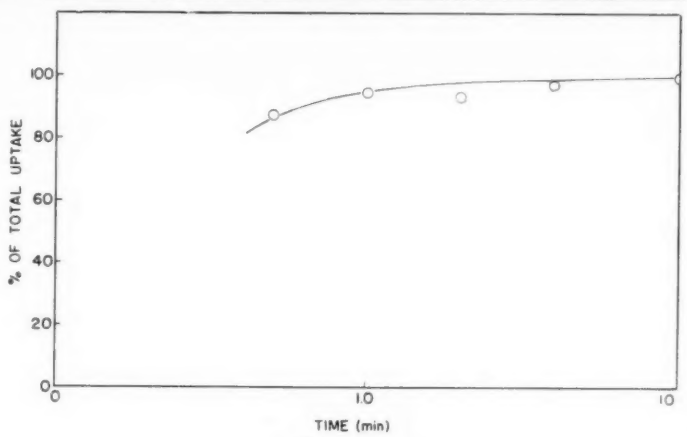


Figure 10

Rate of uptake of Br from 4.5M NaBr solution by unstabilized viscose monofils.

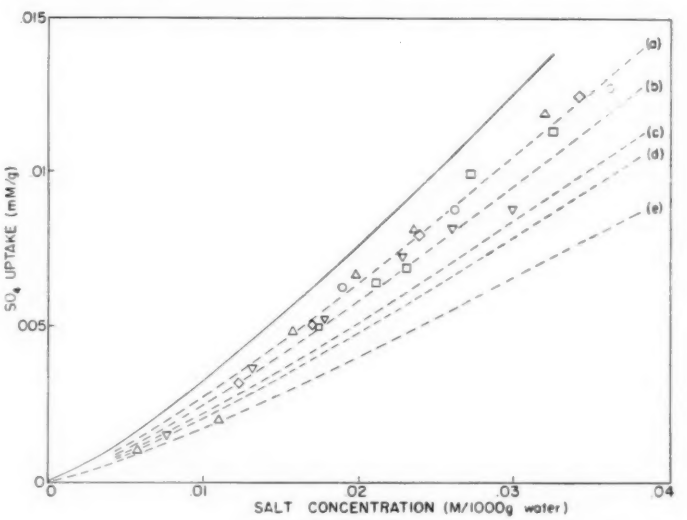


Figure 11

Effect of dye on the uptake of SO_4 from Na_2SO_4-dye solutions at 90°C.

Dye/salt ratio	*Experimental*	*Theoretical curve*
0	—	
.0065	○	a
.0108	△	b
.0186	□	c
.0234	◇	d
.0367	▽	e

TABLE VIII

Uptake of Dye and SO_4 by Stabilized Monofil at 90°C

Salt conc (M/1000g water)	*Dye conc (M/1000g water x10⁴)*	*Dye/salt ratio x 10⁴*	*SO_4 uptake (mM/g)*	*Dye uptake (mM/g)*	*k*
0.031	2.02	65	0.011	0.0069	96.5
.019	1.24	65	.0060	.0035	89.4
.0099	0.64	65	.0026	.0014	83.8
.031	3.35	108	.011	.0094	77.6
.019	2.05	108	.0062	.0047	70.5
.0099	1.07	108	.0026	.0020	70.3
.019	3.53	186	.0055	.0062	60.6
.0099	1.83	186	.0022	.0037	66.2
.019	4.45	234	.0058	.0070	52.0
.0099	2.31	234	.0024	.0031	55.1
.0099	3.62	365	.0026	.0039	40.4

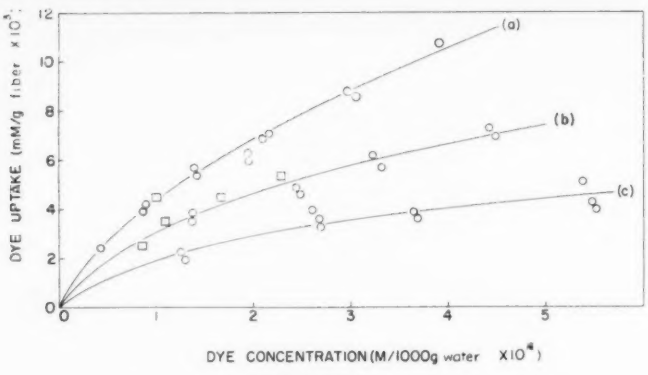


Figure 12

Uptake of Chrysophenine G by viscose monofils at 90°C for different salt concentrations.

Na_2SO_4 Concentration

(a) 0.031 M
(b) 0.019 M
(c) 0.0098 M
O with stirring
□ without stirring

a titration method. It might be mentioned in passing that the tracer method for measuring cation-exchange capacity is potentially superior to titration measurements because it is a direct measurement and should be capable of giving good sensitivity with refinement.

MECHANISM OF ABSORPTION ———Some consideration can also be given to the mechanism of absorption. Perhaps the simplest reasonable picture of the absorption is one in which the salt is considered to be dissolved in water in the pores of the fiber. In such a picture the amount of salt present within the fiber would depend on the concentration of the external solution, on the volume of the pores, and on the cation-exchange capacity. The actual case considered here is complicated by the fact that two cations, Na and H, are present and that the carboxylic acid groups in the H form may be incompletely ionized. As a first approximation, it may be assumed that only one cation, Na, is present and that ionization is complete. In this case two equations can be written:

$$\frac{(Na)^2\,(SO_4)}{V^3} = [Na]^2\,[SO_4] \qquad (1)$$

and

$$(Na) = 2(SO_4) + E \qquad (2)$$

where parentheses refer to the amount of a given ion in the fiber in mM/g, V refers to the free internal volume of the fiber, square brackets refer to the concentration of the external solution, and E is the cation-exchange capacity of the fiber. Equation 1 is an expression of the thermodynamic equilibrium in the system subject to the assumption that the salt is in an aqueous solution inside the fiber and out. Equation 2 expresses the balance of charge within the fiber which is necessary to prevent the spontaneous generation of large electric potentials on the fiber. The two equations can be combined to give

$$(SO_4)\left[\,1 + \frac{E}{(SO_4)} + \frac{E^2}{4(SO_4)^2}\,\right]^{\frac{1}{3}} = V\,[SO_4] \ . \qquad (3)$$

Consider the region of concentration for which $(SO_4) >> E$ so that terms above the first power in $E/(SO_4)$ can be neglected and the cube root can be approximated by the first two terms in its expansion. The equation obtained is

$$(SO_4) = V\,[SO_4] - E/3 \ . \qquad (4)$$

Equation 4 is the equation of a straight line with a negative intercept on the uptake axis. The curve for Equation 3 goes through the origin so that for smaller salt concentrations the dependence of (SO_4) on $[SO_4]$ will be convex to the $[SO_4]$ axis. It is obvious that the cation content of the fiber will parallel the anion content and remain a fixed distance (the cation-exchange capacity) from it.

If small amounts of H ion are assumed to be present in all solutions, the basic nature of the anion absorption curve will remain unchanged. The cation absorption curve will only parallel the anion absorption curve for large salt concentrations and will go through the origin. The simple picture just outlined is thus capable of accounting qualitatively for all features of Figure 4 that do not arise from the instability of the fiber.

It is evident from Figure 6 that the uptake of Br is similar in character to the uptake of SO_4. Values of V can be found by using Equation 4 and the appropriate portion of the anion uptake curve. Best straight lines were put through the high concentration regions of the linear curves for Br and SO_4 uptake by visual estimate and the slopes of the lines determined. The values of V obtained were 0.92 ml/g in the case of SO_4 and 1.05 ml/g in the case of Br. The values are larger than would be expected from estimates of the water absorptive capacity of viscose rayon.

EFFECT OF pH———Other consequences of the competition between H and Na can be seen in Figure 7. As the pH decreases at constant Na_2SO_4 concentration the Na content of the fiber decreases and the SO_4 content increases. The decrease in Na is a natural result of the competition between H and Na. The increase in SO_4 could result from several effects. In the first place as unionized COOH groups are formed the osmotic forces restricting absorption of ions are diminished. Also, at the lowest pH values the concentration of SO_4 in the solution is appreciably increased, since H_2SO_4 was used to obtain the desired pH. Finally, a selective absorption of H_2SO_4 at the expense of Na_2SO_4 might be operating. However, the shape of the curve suggests that the first factor is the most important. Thus, between pH6 and pH4 there is a 33% increase in SO_4 uptake accompanying a 0.5% increase in SO_4 concentration in the solution.

It is interesting that the SO_4 content appears to decrease as the pH increases beyond pH6. At pH6 it is unlikely that there are any COOH groups left in the fiber, so that the decrease must be caused by the removal of some cation with a higher affinity for the COO group than the proton has (or at least a markedly slower rate of desorption) or the removal of anion-exchange sites. In this connection the previous remarks on stability might be noted.

EFFECT OF TEMPERATURE——— The effect of temperature on Na and SO_4 absorption is shown in Figure 5. Temperature coefficients for equilibrium absorption cannot be determined until possible complications resulting from instability are removed. How-

ever, the temperature coefficient for cation absorption is certainly small and that for anion absorption would be anticipated to be small also. All in all there is no evidence for any appreciable heat change during the absorption process.

RATES——Accurate estimates of diffusion coefficients in a fiber cannot be made without an accurate measurement of the fiber's diameter; in the present case the water-swollen diameter of the fiber is involved. No such measurement was made. However the rate of absorption curve for SO_4 is roughly three orders of magnitude faster than a similar curve for hair (*9*) from which a diffusion coefficient $D = 4x10^{-11}$ cm²/sec was calculated. The swollen diameter of the viscose monofil was estimated to be about 15% smaller than that of the hair. All in all a diffusion coefficient of order of magnitude 10^{-8} cm²/sec is indicated. A diffusion coefficient of this order of magnitude is compatible with the idea that the salt is present in aqueous solution within the pores of the fiber.

SUMMARY —— In summary, when dye is not present, the results all suggest that the mechanism of absorption can be considered to be uptake of aqueous solution in the pores of the fiber with the relative amounts of cation and anion controlled by the cation-exchange capacity of the fiber. Farrar and Neale (*4*) reached a similar conclusion in a study of the uptake of several salts by cellophane, although certain salts at high concentrations seemed to have a specific affinity for the cellulosic material.

Absorption of Ions in the Presence of Dye

A discussion of the uptake of salt in the presence of dye must logically start from the present theory of dyeing of cellulose which can account for much of what is currently known about dye absorption equilibria to a first approximation (*1*). In this theory dye and salt are considered to exist in an aqueous solution in pores within the fiber. In addition, dye is assumed to be absorbed on absorption sites on the surface of the pores. According to this picture a form of Equation 1 can be written for salt and for "unbound" dye, and in addition the equilibrium between the "bound" and "unbound" dye anions can be expressed by the equation

$$\frac{(D)'}{B - (D)'} = k' \frac{(D)''}{V} \qquad (5)$$

where $(D)'$ refers to the "bound" dye, $(D)''$ to the "unbound," B is the number of absorption sites and k′ contains a standard free energy of absorption term and unit-conversion factors. The fiber is assumed to be an equipotential region. It is usually assumed that $B >> (D)' >> (D)''$ so that $D = (D)' + (D)'' \cong (D)'$ and Equation 5 can be written

$$\frac{(D)''}{V} = \frac{(D)}{k' B} . \qquad (6)$$

Using Equation 6, assuming the salt to be Na_2SO_4, and assuming the dye to be divalent (as Chrysophenine G is) it is possible to write

$$\frac{(Na)^2 (SO_4)}{V^3} = [Na]^2 [SO_4] \qquad (1)$$

$$\frac{(Na)^2 (D)}{V^3} = k [Na]^2 [D] \qquad (1')$$

$$(Na) = 2(SO_4) + 2 (D) + E \qquad (2')$$

and

$$[Na] = 2 [SO_4] + 2 [D] \qquad (7)$$

where $k = \frac{k' B}{V}$ and complications introduced by the presence of H ion have been ignored. The same equations can be derived for a model in which the dye anions are considered to be under the influence of a non-localized attractive potential within the fiber. In this case the meaning of k is different.

If V is assumed to be a constant and E is neglected, Equations 1, 1′, 2′ and 7 can be combined to give two forms capable of being tested experimentally. They are

$$\left(\frac{(SO_4)}{(SO_4)_0}\right)^{3/2} = \frac{1 + \frac{[D]}{[SO_4]}}{1 + \frac{[D]}{[SO_4]}} , \qquad (8)$$

where $(SO_4)_0$ is the amount of SO_4 absorbed when no dye is present, and

$$\frac{(D)}{(SO_4)} \frac{[SO_4]}{[D]} = k . \qquad (9)$$

In principle, this second equation provides a powerful method for determining k, because the internal volume, which is difficult to measure, does not occur on the left hand side of the equation.

The results presented in this paper have been used in checking both Equation 8 and Equation 9. The last column in Table VIII gives values of k determined using Equation 9. The values are not constant and there seems to be a trend to lower values of k with increasing dye/salt ratio.

The dotted lines in Figure 11 have been obtained from a consideration of the equations leading to Equation 8 using a value of $k = 45.7$, which corresponds to an affinity (as defined by Vickerstaff) $\mu_0 = -2800$ cal mol. This value of μ_0 lies in the range of values found for Chrysophenine G on cellulosic fibers as listed by Vickerstaff (*1*).

It is evident that the theoretical curves do not give a good representation of the experimental results. However, the trend of the experimental results is only qualitatively apparent and their scatter is such that the validity of distinguishing any one set of results from another or from a theoretical curve might be questioned. In order to obtain a more quantitative interpretation of the results, we made use of statistical methods.

It so happens that, when the results for any given dye/salt ratio are plotted as log uptake against log bath concentration, the points fall along a straight line to a good approximation. This fact has been used in the statistical analysis of the results. Straight lines have been determined for each dye/salt ratio (including zero) by the method of least mean squares, and the various lines have been compared by the methods of analysis of covariance.

The following results emerge from the statistical analysis:

1) It is not possible to distinguish between the slopes of the various lines. The average slope is 1.284.

2) There is less than one chance in one hundred that the results without dye are the same as the results with dye.

3) There is at most one chance in five that the results for the lowest dye/salt ratio are indistinguishable from those for the higher ratios.

4) There is at most one chance in five that the results for the two lowest dye/salt ratios are indistinguishable from the results for the three highest dye/salt ratios.

5) The experimental line for dye/salt ratio 0.0065 and the theoretical line for that ratio are indistinguishable. In other words the theory predicts the results within the limits of precision of the experiment.

6) There are at most five chances in one hundred that the results for dye/salt ratio 0.0108 represent results whose true mean values fall along the theoretical curve for that ratio. In

other words, there is only a five percent chance that the theory represents the true results.

7) There is at most one chance in one hundred that the results for dye/salt ratio 0.0234 represent results whose true mean values fall along the theoretical curve.

8) There is even less chance that the true curves for the two largest dye/salt ratios are accurately represented by the theoretical curves.

Thus it is quite certain that, over the range of concentrations and dye/salt ratios used, the presence of dye lowers the salt uptake as compared with the value when no dye is present. It is probable that the amount of salt taken up at a given concentration of salt in the bath decreases as the dye/salt ratio increases. However, for the most part, the differences between the curves for the various dye/salt ratios fall within the precision of the experimental results.

As far as the theoretical curves are concerned, the theory provides an adequate representation of the results only at the lowest dye/salt ratio. As the dye/salt ratio increases, the theory becomes completely inadequate.

The objection might be raised that the value of k used is far from the mean value of the results in Table VIII, which is $k = 69$. However, as k increases the agreement between theory and experiment becomes worse.

Thus, both Equation 8 and Equation 9 are inadequate for predicting the observed behavior. The inadequacy is in some way related to the dye/salt ratio in the dyebath. In discussing this inadequacy some attention must be paid to the assumptions made in deriving the equations. The basic assumption that an aqueous solution exists within the fiber has received some experimental justification. The most serious assumptions left would seem to be ignoring the cation-exchange capacity of the fiber and ignoring activity coefficients.

It is obvious that the presence of cation-exchange sites will depress the absorption of either anion but less obvious what will happen to a ratio such as that expressed in Equation 8. Since Equation 9 can be derived without reference to any cation-exchange capacity, it should hold true regardless of the capacity. Thus consideration of the cation-exchange capacity cannot be expected to alter the discrepancy between Equation 9 and the experimental results.

By ignoring the cation-exchange capacity and introducing single-ion activity coefficients f_i for the dyebath and γ_i for the fiber, Equations 8 and 9 can be written

$$\left(\frac{(SO_4)}{(SO_4)_o}\right)^{3/2} = \left(\frac{f_{(SO4)}\ \gamma_{(SO4)o}}{f_{(SO4)o}\ \gamma_{(SO4)}}\right)^{3/2}$$

and

$$\frac{(D)\ [SO_4]}{(SO_4)\ [D]}\ \frac{\gamma_{(D)}\ f_{(SO4)}}{\gamma_{(SO4)}\ f_{(D)}} = k\ . \qquad (9')$$

The first term on the right hand side of Equation 8′ can probably be safely considered to be unity. It is interesting that, if the term $\frac{\gamma_{(D)}\ f_{(SO4)}}{\gamma_{(SO4)}\ f_{(D)}}$ increases with the dye salt ratio (and its inverse thus decreases), the deviations of the experimental results from Equations 8 and 9 can be qualitatively explained.

Electrostatic repulsion between strongly absorbed dye anions would act to increase the apparent activity coefficient of the dye anions within the fiber and hence would be acting in the right direction. Whether such a repulsion can account quantitatively for the observed results cannot be answered until a satisfactory theory has been evolved, perhaps as an outgrowth of the work of Verwey and Overbeek (*10*).

ACKNOWLEDGMENT

This work was undertaken as part of the Dyeing Research Project of Textile Research Institute. The authors appreciate the guidance of the Project's Advisory Committee representing the textile and chemical manufacturing firms who sponsored this work.

The authors wish to thank Prof J C Whitwell for supervising the statistical analysis, and Dr Lütfü Karasoy and Miss Mildred Stevens for the dye absorption measurements.

Finally, we appreciate the generosity of the American Viscose Corporation, which supplied the fiber sample, and of the Organic Chemicals Department, E I du Pont de Nemours & Co, Inc, which supplied the dye.

$$\left(\frac{1 + \frac{[D]}{[SO_4]}}{1 + \frac{f_{(D)^2}\ \gamma_{(SO4)^2}\ k\ [D]}{f_{(SO4)^2}\ \gamma_{(D)^2}\ [SO_4]}}\right), \qquad (8')$$

LITERATURE CITED

(1) Vickerstaff, T, "The Physical Chemistry of Dyeing," Second Edition, Interscience, New York (1954).

(2) Usher, F L and Wahbi, A K, *J Soc Dyers Col* **58**, 221 (1942).

(3) Neale S M and Standring, P T, *Proc Roy Soc* (London) A 213, 530 (1952).

(4) Farrar J and Neale, S M, *J Colloid Sci* 7, 186 (1952).

(5) Montgomery, D J and Milloway, W T, *Textile Research J* 22, 729 (1952).

(6) Stam, P B and White, H J Jr, *Textile Research J* 24, 785 (1954).

(7) Willis, A F, Warwicker J O, Standing, H A, and Urquhart, A R, *Shirley Institute Memoirs* **19**, 223 (1944-45)

(8) Ant-Wuorinen, O, "Determination of Carboxyl Groups in Cellulose" Report 96, The State Institute for Technical Research, p 48, Helsinki, Finland (1951).

(9) Underwood, D L, and White, H J Jr, "The Physical Chemistry of Dyeing and Tanning," Farraday Society Discussion No 16, p 66, The Farraday Society, Aberdeen (1954).

(10) Verwey, E J W and Overbeek, J Th G, "Theory of the Stability of Lyophobic Colloids," Elsevier, New York (1948).

AATCC Calendar

COUNCIL
Mar 29 (Roanoke, Va); June 7 (New York)

NATIONAL CONVENTIONS
Nov 14-16, 1957 (Hotel Statler, Boston); 1958 (Hotel Conrad Hilton, Chicago); 1959 (Sheraton Park and Shoreham Hotels, Washington, D C); 1960 (Philadelphia, Pa); 1961 (Buffalo, NY)

HUDSON-MOHAWK SECTION
Mar 29 (Johnstown, NY); May 17 (Ladies Nite—Schuyler Meadows, Albany, NY); June 21 (Outing—Antlers Country Club, Amsterdam, NY)

MID-WEST SECTION
February 16 (Hotel Bismarck, Chicago, Ill)

NEW YORK SECTION
Mar 1 (Hotel Delmonico, New York, NY); Apr 26, May 24—ladies nite (Kohler's Swiss Chalet, Rochelle Park, NJ); June (Annual Outing)

NIAGARA FRONTIER SECTION
Mar 15 (Buffalo, NY); Apr 5 (Joint meeting with CATCC at Kitchener, Ont)

NORTHERN NEW ENGLAND SECTION
Mar 1 (Boston area); May 3 (Lowell Tech Inst, Lowell, Mass); Sept 13 (Outing—Wachusett Country Club, W Boylston, Mass); Dec 6 (Annual meeting, Hotel Vendome, Boston, Mass)

PIEDMONT SECTION
Mar 30 (Hotel Roanoke, Roanoke, Va); June 7-9 (Outing—Mayview Manor, Blowing Rock, NC); Sept 28 (Hotel Barringer, Charlotte, NC)

SOUTH CENTRAL SECTION
Feb 16, Apr 27 (Hotel Patton, Chattanooga, Tenn); June 21-22 (Outing—Lookout Mtn, Tenn); Sept 20 (Hotel Patton)

SOUTHEASTERN SECTION
Feb 22 (Auditorium, Pepperell, Ala and Hotel Clement, Opelika, Ala); Apr 13 Legion Hall, Lindale, Ga); June 7-9 (Outing—Radium Springs, Ga); Sept 14 (Harmony Club, Columbus, Ga); Dec 7 (Dinkler Plaza Hotel, Atlanta, Ga)

RHODE ISLAND SECTION
Mar 28 (Providence Engineering Society, Providence, RI); Apr 25 (Student Night—New Bedford ITT, New Bedford, Mass); June 14 (Outing—Warwick CC and Rocky Point, RI); Sept 27 (Ladies Night—Narragansett Hotel, Providence, RI); Oct 24 (Prov Eng Soc) Dec 5 (Annual Meeting—Johnson's Hummocks Grill, Providence, RI)

WESTERN NEW ENGLAND SECTION
Mar 15 (Rapp's Restaurant, Shelton, Conn); May 17 (Ladies Night—Waverly Inn, Cheshire, Conn); June 14 (Outing—Wallingford, Conn); Sept 27 (Rapp's); Nov 1 (Annual meeting—Hartford area); Dec 13 (Rapp's)

Minutes———

Two Hundred and Fourth Meeting of the COUNCIL

THE Council held its 204th meeting at Hotel Statler, New York, NY, 9:30 AM, Friday, November 16, 1956.

1) Present were President R W Jacoby, presiding; Vice Presidents J H Jones, E R Kaswell, W M Scott and F V Traut; A E Sampson, treasurer; C W Dorn, chairman, Executive Committee on Research; Past Presidents J R Bonnar, C Z Draves, H F Herrmann and P J Wood; G O Linberg, J P Ploubides and R D Robinson representing Northern New England; I J Smith, Hudson-Mohawk; L L Heffner representing Washington; J C Cook and S Jack Davis representing Southeastern; R J Carey and R C Geering representing Western New England; W H Bertolet III, A W Etchells, C A Seibert, C A Sylvester and J A Woodruff representing Philadelphia; H A DesMarais representing Pacific Northwest; B K Easton representing Niagara Frontier; A H Gaede, H Y Jennings, J V Killheffer, H A Rutherford, R H Souther and P B Stam representing Piedmont; M J Babey, C A Baker, W Brommelsiek, P J Fynn, J H Hennessey, P J Kennedy, and P J Luck representing New York; F H Casey, E H Gamble and R B Taylorson representing Rhode Island; S M Edelstein of the Archives Committee; J A Doyle of the Publicity Committee; D E Marnon, chairman of the New York Section; G P Paine, executive secretary and R R Frey, assistant secretary.

2) Minutes of the 203rd Council Meeting: The executive secretary's report of the 203rd Council Meeting was accepted.

3) Treasurer's Report: Mr Sampson stated that the principal item in his report was the selection of his successor as he was no longer able, according to his physician, to discharge the exacting duties of his office. He offered a motion which was seconded: that the Council instruct the executive secretary - assistant treasurer to invite Roland E Derby, Sr to accept appointment as treasurer. The motion was adopted.

A motion was made by the treasurer and seconded: that, if the invitation to Mr Derby was accepted, the appointee of treasurer assume the treasurer's duties beginning January 1, 1957. The motion was adopted.

A motion was made by the treasurer and seconded: that the Council instruct the present treasurer to prepare in conjunction with the auditors, Price, Waterhouse and Company, a financial statement as of December 31, 1956 and present it for Council approval at its meeting on January 18, 1957 at which time the new treasurer will be inducted into office. The motion was adopted.

A motion was made by the treasurer and seconded to adopt the following resolution: Be it resolved that the Council show its great appreciation of the services of Leonard Manchester, who through the years has served so efficiently and loyally as an assistant in the treasurer's office, and that the Council inform him in a suitable manner of that recognition. The resolution was adopted unanimously.

A motion was made by the treasurer and seconded: that the Council authorize the treasurer's office until further notice to secure the services of the Association's auditors, Price Waterhouse and Company, in the preparation of income tax papers when and wherever needed. The motion was adopted.

The treasurer referred to his letter to members of the Council of October 31, 1956 persuant to Council instruction of September 12, 1956 which called for preparation of the Association's 1955 1956 financial statement on an accrual basis. Such a statement had been circulated to the Council.

The treasurer then introduced Leonard Shaw, the representative of Price Waterhouse & Company, the Association's independent accountants. Mr Shaw had been invited to attend the Council meeting for the purpose of explaining the proposed change in the method of presenting the state of the Association's finances at the end of the fiscal year—and at interim periods—from a "cash" basis to an "accrual" basis.

Each member of the Council had been provided, prior to the meeting, with a copy of the "Statement summarizing cash receipts and disbursements for the year ended July 31, 1956" and copies, in draft form, of a balance sheet as of July 31, 1956 and a supporting income statement on an accrual basis. These draft statements had been prepared for discussion purposes only and to show the general form and content of such statements on an accrual basis.

Mr Shaw proceeded to explain the principal differences between financial accounting on a "cash" basis and on an "accrual" basis and to develop the reasons why it was desirable for the Association to make the change to the "accrual" method of accounting. The principal points covered by Mr Shaw's address were as follows:

Since its inception, the accounts of the Association have been maintained on a cash basis and the annual financial accounting has been represented by a statement of cash receipts and disbursements for the year and a summary of the cash balance at the end of the year—either as deposits in bank accounts, the cumulative amount of cash invested in marketable securities and other cash items. This statement of the cash balance does not reflect other valuable assets which the Association may have acquired by the outlay of cash from time to time—such outlay has been shown only as a reduction of the cash balance. Nor does the cash statement set forth any current or long-term liabilities which may have been incurred and are outstanding obligations at the close of any fiscal period. By reason of the omission of certain valuable assets and of liabilities, the statement on a cash basis is not a fair presentation of the financial position of the Association or in accordance with generally accepted accounting principles. Nineteen years ago, as at October 31, 1937, the cash and securities owned (at cost) amounted to approximately $26,000. The value of any inventory of *Year Books*, reprints of articles from the *Dyestuff Reporter* and similar items then on hand was probably negligible. At that time, therefore, the use of the cash basis of accounting might be considered to be appropriate.

As at July 31, 1956 the cash and securities owned (at cost) amounted to approximately $396,000—the accumulation over the years of the excess of cash receipts over cash disbursements. This balance is arrived at after deducting the quite considerable sum of approximately $42,000 paid out for the account of

the *Colour Index*. This total disbursement reduces the cash balance but it also represents a valuable asset which will be eventually—or so it is anticipated—turned back into cash. Other valuable assets which the Association has acquired along the way, by the outlay of cash, which are nowhere reflected in the July 31, 1956 cash statement, include an inventory of "technical" supplies (technical items purchased for resale to members) and also research and office equipment at the Lowell Technological Institute. Liabilities which may have been incurred as of that date are also not reflected in the cash statement, with the exception that a footnote refers to the Association's contractual liability under the joint agreement with the Society of Dyers and Colourists relative to the publication of the *Colour Index*.

In anticipation of the adoption of the proposed change in the accounting method, physical inventories were taken on July 31, 1956 by the staff of the Association of technical supplies and of research and office equipment at the Lowell Technological Institute. These inventories were priced at cost or approximate cost. It was also found that, at July 31, there were accounts receivable, represented by technical supplies sent to members but not paid for.

The recorded and unrecorded assets (in round figures) of the Association as at July 31, 1956 may therefore be summarized as follows:

Recorded:		
Cash, securities owned (at cost), etc		$396,000
Unrecorded:		
Inventory of technical supplies	$14,600	
Accounts receivable	900	
Equipment at cost (before allowance for depreciation)	25,000	
Investment in Colour Index	42,000	82,500
Together		$478,500

With respect to the income of the Association, receipts and disbursements have been allocated under the following headings shown in the cash summary statement:

General Research General Technical Supplies	which may be classified as "Operating" funds
Philadelphia Section Research Project ADR Prize Award Fund Olney Medal Fund Convention Fund	which may be classified as "special" funds
Colour Index Receipts and Disbursements	A "joint" project

On a consistent basis from year to year, certain income has been applied to the funds, referred to as "operating" funds, on the following basis:

General Research:
- Corporate memberships (less $10 per membership applied to General)
- Sustaining memberships
- Investment income from specified investments
- Income from such items as Launder-Ometer royalties, etc.

General:
- Senior, Junior, Associate and Student memberships
- $10. from each Corporate membership
- Investment income from specified investments

Technical supplies:
- Receipts from sales to members of technical supplies (less cost of purchases)

The income applied to General Research and General has been charged with appropriate expenditures during the year.

There seems to be no clear-cut reason why these three separate funds, with due propriety, should not be merged into one operating fund—under the title of Research and General Fund. In the draft income statement presented on an accrual basis it is indicated how this could be accomplished. This income statement has three sections—Income, Deductions from Income and Other Credits, and arrives at Net Income and Other Credits for the year. For the purposes of this accrual presentation, the following items have been added to the reported cash income for the year ended July 31, 1956:

Under Income, the cash income from sales of technical supplies has been increased by the amount of accounts receivable at the year end—set up, per contra, as an asset on the balance sheet.

Under Other Credits, the amounts, at cost, of the inventories of technical supplies and of the research and office equipment—previously charged off on a cash basis—have been credited to income for the year and set up, per contra, as assets on the balance sheet. These items, of course, would be nonrecurring items.

Deductions from income have been classified under Research Costs and Expenses, General Operating Costs and Other Charges. The amounts of these deductions from income, for present purposes, have been shown on the actual cash basis for last year. It is believed that this form of presentation of the operating income and expenses will provide a much simpler and a more comprehensible statement of the Association's operations as compared with the statement on a cash basis prepared heretofore.

Mr Shaw then gave a detailed explanation of the form and content of the proposed balance sheet (as set forth in the draft in the hands of the members). His principal comments on the balance sheet presentation included the following:

Research and General Fund:

The indicated fund balance at the beginning of the year (July 31, 1955) combined with the balances shown on the cash statement as of that date of the General Research, General and Technical Supplies funds, after deducting the expenditures for the *Colour Index*. (Such expenditures had been set up in the separate *Colour Index*-Joint Project fund as advances from the Research and General fund.) To the beginning balance had been added the net income for the year and other credits, as shown by the accompanying income statement, to arrive at the balance at July 31, 1956. The ending balance had been apportioned between an appropriated and an unappropriated amount. The appropriated amount covered appropriations for research projects and for current operations in the amounts provided therefore in the 1956-1957 budget and also the approximate balance of the commitment under the *Colour Index* joint agreement. The unappropriated balance had been designated as a general reserve.

The assets of the Research and General Fund representing the indicated fund balance at the end of the year were shown on the balance sheet to include the previously unrecorded assets referred to earlier—accounts receivable, inventories and equipment,—as well as the reported cash balances, investments, etc on the cash basis.

Colour Index—Joint Project:

The present composition of this fund was explained. Certain features of the joint agreement with the Society of Dyers and Colourists were commented upon. This agreement requires that all costs in connection with the compilation, printing, distributing, etc of the *Colour Index* are to be borne equally by the parties thereto. Future net losses or revenues arising from the production and sale of this work are likewise to be borne or shared equally by the parties. The agreement further requires annual equalization settlements between the parties with respect to costs paid and revenues received by each. Because of British exchange regulations, the annual equalization settlements through December 31, 1955 had been waived by mutual agreement.

Because of the vagueness of the terms of the agreement in some respects, relating not only to the basis of periodic financial settlements, controversial matters between the parties may be expected to arise. No specific provision, for example, had been made

with respect to rates of exchange prevailing during the term of the agreement.

Special Funds:

The sources of income to and the expenditures for the special funds shown on the balance sheet were reviewed as well as the assets held for each fund.

Mr Shaw concluded by making a strong recommendation to the Council for the adoption of the accrual and fund basis of accounting along the general lines which he had presented.

In reply to a question as to the possible additional cost of maintaining the accounts on the proposed new basis, Mr Shaw expressed the opinion that there would be some initial cost in connection with setting up the necessary accounting procedures and training a bookkeeper. He pointed out that, since the inception of the Association, clerical assistance for maintaining the treasurer's accounts had been supplied at no cost to the Association. With respect to Price Waterhouse fees, except for some initial charge, he did not anticipate any very substantial increase therein.

A motion was made by P J Wood and seconded by J Robert Bonnar that: the accrual method of accounting with anticipated modifications be put into effect as soon as possible. The motion was adopted.

The treasurer reported that all bills presented to him by November 1, 1956 had been paid. There was $58,-984.44 in the treasurer's checking account. The dues payments as reported by the executive secretary-assistant treasurer were satisfactory. The Association's cash position, 90 day certificates, US bonds, Savings Bank accounts placed it in an enviable position to take advantage of any market opportunities. As for investment securities, the Association was consistent with the "prudent man policy."

A motion was made and seconded: that the treasurer's report be accepted. The motion was adopted.

4) *Perkin Centennial — General Program:* Mr Linberg presented an MIT chair to Mr Jacoby on behalf of the members of the Executive Committee and chairmen of the committees of the Perkin Centennial in recognition of his work and leadership as chairman of the Perkin Centennial Executive Committee.

5) *Textile Education Committee:* Professor Rutherford stated that $125,000 had been suggested to publicize reasons for young people going into the textile industry. Last summer an attempt had been made without success to raise a small amount of money for this purpose. There was evidence that there was a demand for graduates. He said that the North Carolina Textile Manufacturers Association had started a program and would publish a promotional brochure. Professor Rutherford had presented the case of career opportunities at a meeting of high school students in Richmond, Virginia on November 2nd. When asked for more information after the meeting he had no material to send. The students in the audience had not realized the opportunities in the textile industry.

He proposed that a brochure which he stated had been authorized by the Publications Committee be followed up, suggesting that textile schools be asked to contribute to its cost. Several hundred thousand copies should be printed. Scholarships were needed at the freshman level. He suggested that the Council promote company-sponsored four-year sholarships. The North Carolina Textile Manufacturers Association had approached mills to provide four-year, $500 per year scholarships with summer employment provided. He recommended that AATCC promote a program to include an educational brochure, scholarships on a competitive basis and talks to high school students.

Mr Souther commented that textile schools should broaden their curriculums to emphasize English, mathematics and accounting for better preparation for management jobs.

Professor Rutherford distributed to the Council copies of a promotional sheet headed "Eight Jobs per Man", which outlined career opportunities in the textile industry. He had prepared this circular in the absence of any available promotional material.

6) *Organization Committee:* Mr Herrmann stated that the subject of AATCC's relations with Howes Publishing Co, Inc had been assigned to the committee about a year ago and that a number of meetings had been held for discussion, the most recent on November 14th. The sense of the Committee was that the merits of the contentions of both sides of the issues were sufficiently valid to warrant a continuing investigation; that in fairness to the Association and the Howes Publishing Co, Inc professional counsel be engaged. A preliminary investigation was underway to obtain the name of a suitable agency to handle this study and an estimate to its cost. The issues involved are: 1) Shall we continue with the present contract for a few years and then reopen the case. 2) Shall the contract be amended now and, if so, in what manner. 3) Shall we cancel the contract on three years notice and select another publisher who will extend more favorable terms. 4) Shall we undertake to do our own publishing. Since this matter was the responsibility of the Publications Committee, the Organization Committee recommended that the President reassign the project to the Publications Committee and leave the question of obtaining further help from within and outside to it.

The Organization Committee had become involved in the project principally because of its study of the desirability of establishing the new office of executive secretary and assistant treasurer and the possibility of this function serving as a nucleus for a potential publishing venture. The Organization Committee had carried the investigation as far as its authority went and recommended that all further work be done by the Publications Committee.

7) *Publications Committee:* Dr Scott stated that the Publications Committee had been presented with a report of the November 14th meeting of the Organization Committee concerning possible changes in arrangement for official publications of AATCC. The Publications Committee had voted to recommend that the Council authorize the president to appoint a small special committee to investigate the situation with authority to hire outside specialists to make an unbiased professional survey of all possibilities.

A motion was made and seconded: that the president appoint a special committee of the Association to consider the Howes contract with authority to hire outside specialists to make a survey. The motion was adopted.

Dr Scott reported the following appointments to the *American Dyestuff Reporter* Award Committee: Robert W Joerger, Richard B Stehle and Hector C Borghetty.

Copyright of the *Colour Index* was discussed. Dr Scott explained that if copyrights were taken out on a book published in another country, a maximum of 1500 copies can be imported. Several possibilities might overcome this limitation such as a joint copyright taken out by AATCC and the Society of Dyers and Colourists, a copyright under the Universal Copyright Convention or a United States copyright taken out by the Society of Dyers and Colourists. Dr Scott stated that he would contact the copyright office in Washington to resolve

the question.

The Society of Dyers and Colourists had proposed that supplements to the *Colour Index* be issued every two years. The Publications Committee felt that five-year intervals would be adequate although no conclusion was reached, for this was a matter for Council decision. The Publications Committee would give further study to the subject and subsequently make recommendations to the Council for action.

Mr Cady had enumerated his many and arduous duties to the Publications Committee in connection with the *Year Book* and had requested an editorial board be organized to assist him. The Publications Committee had approved the following appointments: George P Paine, executive secretary; Harold W Stiegler, director of research; Norman A Johnson to represent the publisher and William A Holst to act for the Dyestuff Section.

Mr Cady had pointed out that the Section on The Analysis of Fibre Mixtures in the *Year Book* was out of date. The Publications Committee had decided to turn the matter over to AATCC-ASTM joint committee with a view to incorporating the latest methods in this Section of the *Year Book*.

8) *Executive Committee on Research:* Mr Dorn stated that Professor H A Rutherford had submitted a written proposal for a project on "The Application of Radiochemical Techniques to Textile Problems," which the Piedmont Section was interested in undertaking. Approval was voted for the Piedmont Section to proceed with its study, taking cognizance that AATCC corporate funds must not be disturbed and that the results should be published in the *American Dyestuff Reporter*.

George M Gantz, chairman, Committee on Bleaching, had submitted a proposal that authorization be granted for a study by a graduate student on the relative merits of the Cuan and Cuen methods of determining the fluidity of cotton. It was decided that such an approach would not be practical. The Committee was advised to discuss the problem of the two methods of determining fluidity with Dr Conrad of Southern Regional Research Laboratories, who has made a detailed study of the subject.

The following new chairmen were approved for TCR research committees: Rapid Control Tests Committee, Max Winkler to replace Emil C Hansen; Washfastness Committee, Ralph B Smith to replace P J Fynn; Dimensional Changes, John F Warner to replace Harry C Donaldson, Jr; Antistatic Finishes Committee, Fred H Steiger to replace S N Glarum.

Approval was voted for the following L-14 Test Methods drawn up by ASTM which had to be approved by AATCC as a cosponsor of that committee: Definitions of terms relating to textile materials; Method of test for fineness of wool tops; Method of test for fineness of wool; and Test for fiber length of wool tops. Withdrawal of "General Methods of Testing Cotton Fibers" as an American Standard was approved.

Dr Stiegler had reported on projects worked on by the AATCC Research Staff during the first quarter of the 1956-57 fiscal year covering abrasion, dimensional changes, flammability, lightfastness and washfastness.

The proposed radiant heat project was discussed and Edward W Lawrence was authorized to contact members of the wet-finishing industry to ascertain the need for such a project.

The article entitled "Comments Invited by FTC on Dyed Fabric Description" published in the October 26th issue of the *Daily News Record* had been discussed. This article contained a statement to the effect that there was a lack of any generally acceptable test methods for colorfastness. It was decided not to take public issue with the article, but to take advantage of every opportunity to publicize acceptance of our test methods in Commercial Standards.

The following new members were approved for appointment to the Technical Committee on Research: Fred Fortess of the Celanese Corporation of America; Miss Genevieve M Smith of Sears, Roebuck & Co; and P J Fynn of the J C Penney Company.

Approval was voted to change the status of the following committees from active to reference committees with their present chairmen serving as reference chairmen: Snag Resistance Test; Standard Depths of Shade for Dyestuff Fastness Evaluation.

A motion was made by Mr Dorn and seconded: that Evaluation of Snag Resistance of Hosiery; Resistance of Wetting (Static Immersion Absorption Test); Resistance to Water Penetration (Impact Penetration Test) be raised from tentative to standard tests. The motion was adopted.

9) *Executive Secretary — Assistant Treasurer's Financial Report:* The financial report of October 25, 1956 was accepted.

The following resolution was offered by the executive secretary:

WHEREAS Hugh Christison has passed away after a full life of fruitful service to his fellow men,

WHEREAS during his many years of faithful and devoted service to the American Association of Textile Chemists and Colorists, first as a Charter Member, then member of numerous research committees, councilor, vice president and Honorary Member, therefore be it

RESOLVED that the Council of the American Association of Textile Chemists and Colorists in regular meeting assembled, honor the memory of Hugh Christison and extend sincere condolences to his family and be it

FURTHER RESOLVED that the resolution be spread on the minutes of this meeting and that a copy signed by the president and the executive secretary be sent to the family.

A motion was made and seconded: that the resolution be adopted. The motion was unanimously adopted.

10) *Report of Vice Presidents:* Mr Jones stated that he had been present at the recent Mid-West meeting which was attended by about 30% of the members. An excellent program had been presented.

Mr Kaswell reported on the Western New England Section meeting which he attended. He stated that as chairman of the 1957 Convention Committee he could report that committee appointments had been completed. It was the intent of the Committee to run a frugal convention with low prices to encourage a large attendance.

Mr Traut had attended the Reading meeting of the Philadelphia Section at which about 250 were present. He had also attended a meeting of the New York Section and was planning to attend the Hudson-Mohawk Section meeting. Mr Traut said that the New York Section was planning a luncheon symposium at the Hotel Delmonico in New York on January 23rd with a program built around the theme "Changing Trends in Military Requirements—The New Look in Military Textile Purchasing and Distribution." Accommodations for the symposium would be limited to an audience of 450.

11) *Appropriations Committee:* Mr Sampson referred to the reports of the chairmen of the Organization and Publications Committees concerning the contract with Howes Publishing Co, Inc and the motion authorizing the special committee to employ professional consulting services. A motion was made by Mr Sampson and

seconded by Mr Fynn: that the Howes Contract Committee, sponsored by the Publications Committee, be allotted a sum of money not to exceed $1,000 for the purpose of conducting a survey of the Association's contractual relations as concerns the publication of the *Proceedings* and *Year Book* of the Association. The motion was adopted.

A motion was made by Mr Sampson and seconded by Dr Draves: that the budget of the Corporate Membership Committee, Account R-8 be increased by the sum of $1,000 to a total of $3,000. Mr Sampson pointed out that there was $635 of the Corporate Membership Committee's budget of the previous fiscal year that had not been used. While this could not be carried over to the current fiscal year, the original plans for printing of Corporate Membership certificates were in progress along with other promotional activities. Therefore in essence, the Corporate Membership Committee was asking for only $365 more than was envisioned in its long range plans to take care of arrangements for enlisting new Corporate Members in 1957. The motion was adopted.

The motion was made by Mr Sampson and seconded: that the treasurer be instructed by the Council to open a checking account in the First National Bank of Boston under the designation of the AATCC Convention of 1957; that there be deposited in the said bank the sum of $3,000; that signature cards be issued to cover Azel W Mack, treasurer of the 1957 AATCC Convention as custodian of the account; instruct Ernest R Kaswell, chairman of the 1957 Convention, to have Mr Mack and such other personnel as are concerned with Association Convention funds bonded in the Seaboard Surety Company as are adequate for Convention Fund protection during operation of the account; to arrange for Price, Waterhouse and Company to be available for consultation purposes to the Convention accountants.

Mr Kaswell, chairman of the 1957 Convention Committee, desired to have the Harvard Trust Company designated as a matter of convenience to the Convention treasurer. On further discussion a motion was made and seconded to amend the original motion leaving the selection to the designation of the treasurer of the Association and the treasurer of the 1957 Convention. The amendment was adopted. The original motion was put to a vote and adopted.

The motion was made by Mr Sampson and seconded: that the permanent equipment account budget, G-4, of $1,000 be increased to $2,000 to cover the introduction and operation of a new record system at the National Headquarters office as recommended by the Archives Committee. The motion was adopted.

A motion was made by Mr Sampson and seconded by Mr Traut: that the Council authorize the treasurer to assign under the Technical Supplies Account an M account number to cover the proposed publication of the Perkin Centennial papers; to instruct Mr Herrmann, treasurer of the Perkin Centennial, to transfer to the Association treasurer sums accumulated for that purpose for assignment to the M account; to instruct the executive secretary to advise the chairman of the Publication Committee to prepare a budget for the project for submission to the Appropriations Committee for approval. The motion was adopted.

A motion was made by Mr Sampson and seconded by Dr Draves; that the Council authorize the treasurer's office to make such changes in the issuance of purchase orders and the handling of expense accounts as may be consistent with good business practice and improved operations. The motion was adopted.

The motion was made by the treasurer and seconded by Mr Kaswell: 1) that 125 rights issued by the Chase Manhattan Bank be converted into eleven shares of common stock; 2) that seven additional rights be purchased and also 14 additional shares to raise the total holdings from 136 to 150 shares. The motion was adopted.

Mr Sampson stated that the Appropriations Committee was still working on the investment and arrangement of a portfolio of securities based on the instructions from the Council at previous meetings.

12) *Archives Committee:* Mr Edelstein stated that this Committee had been particularly concerned with the development of a plan for the organization of the current files as well as the historical records of the Association.

Through the recommendation of government archives officials in Washington, the Committee had been in contact with the National Records Management Council. Numerous meetings of the members of the Archives Committee, the president and executive secretary, with the National Records Management Council, had resulted in a proposal whereby the National Records Management Council would undertake to organize the current files of the Association and to set up new procedural arrangements to insure maximum efficiency in working with the records.

The Archives Committee had agreed that there is need for such a rearrangement of the records system at Lowell and had unanimously recommended that the Appropriations Committee consider the allotment of approximately $1,000 to carry out the work proposed by the National Records Management Council.

A complete set of all actions of the Council of the Association up to the present time, together with ADR references to these minutes, had been prepared through the years by William H Cady and had been lent to the Archives Committee. The Committee had photostats made of this very useful report and furnished copies to the president and to the executive secretary. To make this material even more useful, an index was being prepared by Paul Wengraf, who graciously offered his services free-of-charge to the Committee as bibliographer and technical assistant. Any subject discussed at Council meetings at any time, could be checked from this index and the appropriate issue of the *Dyestuff Reporter* wherein this information was given could be found. Publication of the index would be desirable.

The chairman recently spent several days at Lowell going over again the archives material previously discussed in an earlier report. Early records of the first secretary of the Association, a court stenographer's report of the organizational meeting of the Association, as well as other important communications of historical interest were found. A more detailed examination of the Olney correspondence revealed important material relative to the first five years of the Association but that the remaining correspondence had little to do with the work of the Association. Missing at the present moment is correspondence of Dr Olney as head of the Research Committee during the period from 1929 to 1936. Further searches at Lowell may turn up this important material.

During the visit to Lowell, Howard K Moore, head of the Libraries at LTI, George R Griffin, head of the Chemistry Department, as well as Everett Olsen, assistant to the president at Lowell Technological Institute, were extremely cooperative and offered every possible help in the work of the Archives Committee. Dr Stiegler had continued to be of great help to the Committee. The room which has been set aside tentatively for the Archives Committee in the Library Building was examined and

should be very satisfactory provided arrangements are made for keeping the temperature and humidity constant.

A considerable amount of material has already been turned over to the Archives Committee from outside sources. Of particular interest is a large collection of early dyestuffs, both synthetic and natural, obtained from Harvard University.

There was still a great deal of outside material available to the Archives Committee of the Association. The *Dyestuff Reporter* had been particularly kind in offering free space to advertise for such material at any time. It was felt, however, that no concerted effort to obtain additional items be made until the Archives room at Lowell is ready for their proper storage.

Mr Edelstein introduced for the record the following proposal which had been received on request from the National Records Management Council, Inc:

Members of the American Association of Textile Chemists and Colorists have approached the National Records Management Council with regard to devising a proper system for the care of the Association's current and historical records. The problem, as presented to the Council, is a three-fold one:

1) Organization of current files to best fit the Association's administrative needs.
2) Organization of historical records for maximum protection and use convenience.
3) Procedural arrangements insuring that historical records will be saved, so that in the future, the documentation will not show the gaps that now exist in some of the early material.

The Council accordingly submits the following prospectus as a plan of attack on the Association's record problems.

The National Records Management Council proposes to carry out a preliminary study looking forward to the proper organization and maintenance of both current and historical records at the Lowell Technological Institute. This study would consist of a detailed analysis of the current practices at Lowell and would eventuate in a complete report of recommendations to the Association.

The detailed analysis at Lowell would cover:

1) Filing, mailing, and other paperwork procedures.
2) Filing classifications, indices, and finding aids.
3) Forms, reports and correspondence controls.
4) Housing and maintenance of the records.
5) Subject content of file and record groups.

Our report to the Association would include:

1) A recommended organization and classification of current files upon functional lines, and based upon the Association's use of the files.
2) A recommended retention schedule, tied to the file classification to indicate the proper retention for each class of material.
3) A recommended classification of historical records, tied in with the classification of current records and the retention schedule.
4) A manual detailing proper housekeeping practices for the maintenance of the files.
5) Recommendations for the housing and physical maintenance of both current and historical records.
6) Recommendations for any changes in paperwork procedure or control that would enhance economy and efficiency in operation.

The Council would not undertake the clerical work involved in the actual physical rearrangement of the papers. We would limit our participation to reclassification and the development of policies. This method provides two advantages for the Association:

1) It would not require the payment of a consultant's fee beyond the point of diminishing returns.
2) The AATCC clerical staff would gain valuable experience and training that might otherwise be lost.

The preliminary study as outlined above would require one man for approximately one week in Lowell and an additional one or two weeks consulting with out staff and writing the report here in New York. The flat fee for the study as described above would be $750 plus travel and living expenses away from New York. The travel and living would not be expected to exceed $200 to $250. If the Association should later wish the Council to provide some technical assistance during the implementation of the program, that could be arranged at that time on a *per diem* basis.

13) *Colour Index Marketing Committee:* Mr Sampson referred to a meeting with Clifford Paine, president of the Society of Dyers and Colourists, held in New York in September when a number of issues were discussed which required further clarification. The committee was endeavoring to assemble complete information for the January meeting of the Council. Everything possible was being done to speed up delivery of the *Colour Index*.

14) *Constitution and Bylaws Committee:* In the absence of Mr Holst, Mr Paine reported that the Committee had under consideration such revisions as might be necessary in connection with the newly created office of executive secretary—assistant treasurer. The Committee also had before it the question of procedure to be followed for interpretation of the constitution and bylaws.

15) *Subject and Speaker's Bureau Committee:* Mr Babey stated that the committee was continuing to assist the Sections in obtaining speakers. Since the last Council meeting three speakers have been placed.

16) *Intersociety Relations Committee:* Dr Draves cited the provision of the bylaws prohibiting the endorsement of specifications in the name of the Association. This had created a problem with respect to the Association's representation in committees of the American Standards Association, particularly the Consumer Goods Standards Board. The members of the Board were responsible for approving the procedures under which American Standards in the consumer field were developed. While this approval did not indicate approval of the technical content of the standard it certified that the procedures followed were in order. Dr Draves requested that the Council give permission to the Committee for suggesting to the American Standards Association a qualifying statement to be appended to AATCC votes specifically excluding technical content other than test methods.

The president suggested that this might be considered further by the Intersociety Relations Committee and that a report of the Committee be submitted to the Council prior to any Council action.

17) *Publicity Committee:* Mr Doyle would send a copy of the recently issued publicity manual to members of the Council. He reported that the Committee was continuing to collect clippings of news items of the Perkin Centennial. He believed that the Centennial publicity was successful in the light of a relatively limited budget. The Committee expected to

obtain wide coverage on the election of officers and was prepared to issue releases in the major cities and to the trade press.

Mr Doyle had had discussions with the chairman of the Publicity Committee for the 1957 Convention and plans were under way to develop an effective working relationship between the National Publicity Committee and the Convention Publicity Committee.

18) *Membership and Local Sections Committee*: Mr Jones reported that 137 membership applications had been received since the last meeting of the Council: Senior, 66; Transferred to Senior, 5; Associate, 20; Junior, 6; Student, 30; and Corporate, 10. The motion was made by Mr Jones and seconded: that the applicants be elected to membership. The motion was adopted. (See Appendix.)

Mr Jones stated that the Philadelphia Section was conducting a poll of its membership with respect to changing its name to the Delaware Valley Section. The Philadelphia Section had requested to be permitted by the Council to change its name if so desired by its members. The motion was made by Mr Jones and seconded: that the Philadelphia Section be renamed the Delaware Valley Section if its members so desired. The motion was adopted.

19) *Perkin Centennial — General Program*: Mr Linberg commented on the high quality of the papers presented and the attendant publicity in the trade and daily press. The President commented that there were 2229 registrations which included 236 ladies and 8 students. There were 1357 AATCC members and 628 from other organizations totaling 1985 regular registrants.

20) *Perkin Centennial Treasurer*: Mr Herrmann reported that total receipts were $118,783.48. To that was added a loan from the parent body of $10,000 so that total money involved was $128,783.48. Present balance in the First National Bank of Boston was $3,637.09. Adjustments would bring in about $50.00. After payment of outstanding bills there would be a net loss of $6,312.81. Total registration produced minus the cost of registration was $18,796 against which was a printing bill of $19,912.06 and other smaller bills. Preparations had been made for a much larger registration. Mr Herrmann attributed the Centennial loss to insufficient registrations.

Mr Herrmann recommended that as soon as all bills had been paid, the accounts be audited by Price, Waterhouse & Company after which the treasurer and others be discharged from their duties and bonds, and that the *Proceedings of the Perkin Centennial* be handled as an entirely new venture. He would transfer the balance of the $10,000 loan, about $3,687 to the AATCC treasury. The treasurer would recommend the Council authorize the organization of a committee to publish the *Proceedings of the Perkin Centennial* for distribution to the 2,000 registrants plus such further sale as would be decided upon.

The treasurer of the Centennial suggested that figures be published after the final audit.

The president noted that 74 AATCC members had registered for the exhibits but had not registered for the Centennial.

21) *Perkin Centennial Printing Committee:* The president asked Mr Hamilton to report on the Proceedings *of the Perkin Centennial*. Mr Hamilton stated that the final manuscripts had greatly exceeded the committee's expectations in length, tables, charts, graphs, formulas, equations and pictures. Funds to produce the book were to come from a portion of the registration fees. Based on 80 to 90% of the manuscripts available, the printing would be considerably higher than originally estimated. He stated that two thousand copies would require about 3½ tons of paper and 500 yards of cloth for binding. Several printing firms had been approached and $23,500 was estimated as an absolute maximum cost including mailing cartons, sealing books in the cartons, postage and the inclusion of Dr Edelstein's historical booklet which he was furnishing at no cost to the Association.

President Jacoby had contacted companies by phone and mail whose representatives had presented forty papers at the Centennial and had asked them to help underwrite the cost of the book to the extent of $400 for each paper. He had received a very good response to this appeal. Some companies were interested in reprints of papers which would produce additional revenue. A normal overrun on the printing would make extra copies available at no further cost. To sell these, a Centennial program was being sent to all members promoting orders for copies of the book.

Several alternatives to printing the book were discussed. A refund to registrants was considered, publication of the papers in the *Dyestuff Reporter*, advertising in the book, cutting contents of papers. No action was taken on these proposals.

22) *President's Remarks:* Mr Jacoby was presiding at his last Council meeting and wanted to thank the members for their help, kindness and consideration during his terms in office. He expressed appreciation for all they had done. He felt he had had a position of responsibility as well as one of honor and had tried to fulfill it to the best of his ability. He concluded by stating that the Association was fortunate in the fact that no matter who was elected, the AATCC would have an excellent president.

23) *Adjournment:* A motion was made and seconded: that the meeting adjourn. The motion was adopted whereupon the Council adjourned at 1:10 PM.

Respectively submitted,
G P Paine
Executive secretary

APPENDIX

Elected to Membership November 16, 1956

CORPORATE

Emkay Chemical Co
L W Frohlich & Co Inc
Gagliardi Research Corp
Herman Miller Furniture Co.
E F Houghton & Co
Packard Mills, Inc
Phoenix Trimming Co
Richmond Piece Dye Works, Inc
Seydel-Woolley & Co
Strong, Hewat & Co

SENIOR

J T Adams
M Antoni
A S Ashley
A Bauman
P T Bodell
J A Boublis
W C Brown
J V Brunetta
E Burke
L S Cammarano
T L Christenbury
R D Cirillo
R L Clapp
J F Clark
M L Clement
M A Cooper, Jr
J V DeMick
A Desmarais
C G Deuber
P E DiBianco
W Diamond
J H Duffy
F C Fatora
J H Firpo
G H Foeman
W G Fu
F E Geary
C D Getgood
J R Gilman
D M Goerg
W A Howard
H M Keeton
E N Kramer
R E Lacy
L Lasas
A L Lefler
D W Leuze
R A Lewis

M J Macaulay
L Malcolm
R Y Matsui
F S McAllister
L W Melton
E E Miller
J E Myers
O W Peterzen
C E Pickard
T E Powell
R C Richardson
F O Robitschek
A A Ruggiero
I Schnopper
J H Schoenfeldt
R C Scrimgeour
L Segal
J F Soteriou
G Vero
A R Wagner
J E Warner
B Walden
R L Wayland, Jr
M A Wittingham
J D Wilson
L M Wise, Jr
E Yeadon
H A Zuhl

JUNIOR

R H Brehm, III
A W Francis, Jr
O F Kattan
J M Kuschwara
R E Mattson
J S Walker

ASSOCIATE

F E Beudry, Jr
P M Benguerel
E M Brazo
R L Collet
M W Flewwellin
N J Giglio
V J Houska
J C McDowell
W McMunn
R H Montgomery
R A Padovani
B F Purdy
T Sadayasu
W I Schlags
Z Z Shorter
H Sofue
C W Stillwell
F L Thomas
L Travis
L Voorspuy

STUDENT

M Andrade
J P Ang
B J Bailey
J A Bedard
B F Bennett
A F Cheatham
N R Cohen
J L Davison
A R Flickstein
R Freligh
N S Kim
K S King
J S Lang
Y C Lee
E L Liguori
C D Livengood
G A Lyna
B P McGinn
G O Meacham, Jr
W A Mills, III
J J O'Keefe
H J Patterson
R L Pruitt
R C Ruark, Jr
S E Sledziewski
T T Sylianco
R Tabani
V H Ure
O E Wilson
J C Yancey

TRANSFERRED FROM OTHER CLASSIFICATIONS TO SENIOR

D W Belcher
F J Feeny
A J Owens
N H Sherwood
F C Whitfield

AATCC MEMBERS ARE URGED TO ADVISE NATIONAL HEADQUARTERS OF ANY CHANGE OF ADDRESS. WRITE TO: PO BOX 28, LOWELL, MASSACHUSETTS

Membership Applications

SENIOR

Larner Ambruster—Textile lab techn, E I du Pont de Nemours & Co, Inc, Charlotte, N C. Sponsors: H H Field, M D Haney, Jr.

Clyde C Cobb—Asst general mgr, Riegel Textile Corp, Trion, Ga. Sponsors: P H David, D W Kern.

Eldridge B Cook, Jr—Research chemist, Emery Industries, Inc, Cincinnati, O. Sponsors: H T Buckley, J A Piepmeyer.

Norman E Elsas—President, Nemo Industries, Inc, Atlanta, Ga. Sponsors: C R Gill, H G Smith.

William H Gregory—Supt, dyeing & finishing, Seymour Woolen Mills, Seymour, Ind. Sponsors: C E Maher, V H Lawrence.

Marvin L Huckabee—Chief chemist, Lyman Printing & Finishing Co, Lyman, S C. Sponsors: T D Fulmer, R L Hunter.

Paul K MacDonald—Tech correspondent, General Aniline & Film Corp, Providence, R I. Sponsors: H F Weidman, W M Dewing.

Emery G Maynard—Superv, bleach, dye & finish, Ansonia Mills Inc, East Taunton, Mass. Sponsors: A W Mack, J W Macneil.

Aubrey F Neister—Lab tech, Blackman Uhler Co, Spartanburg, S C. Sponsors: D W Belcher, E R Roper.

Edgar J Valois—Asst dyer, Berkshire Hathaway, Inc, King Philip Finishing Division, Lonsdale, R I. Sponsors: H A McCleery, J J Dillon.

Dale C VanderVoort—Staff asst to VP, Fin Division, United Merchants & Manufacturers, New York, N Y. Sponsors: D F Allen, R W Jacoby.

Kenneth E Watts—Owner, Kenneth E Watts, Sailmaker; president, Texlon Corp, Torrance, Calif. Sponsors: B F Faris, R L Hunter.

Melvin Wiener—Lab supervisor, Maiden Form Brassiere Co, Inc, Bayonne, N J. Sponsors: J K Frederick, R E Morrison.

James E Woody—Quality control tech, Blackman Uhler Co, Spartanburg, S C. Sponsors: D W Belcher, E R Roper.

JUNIOR

William F Dolan, Jr—Sales, Textile Chemicals Div, Nopco Chem Co, Harrison, N J. Sponsors: W E Brenner, R G Schaubhut.

ASSOCIATE

William A Coleman—Salesman, Blackman Uhler Co, Spartanburg, S C.

Ernst F Gobel—Tech director, Companhia de Anilinas, Rio de Janeiro, Brazil.

Dean E Luther—Salesman, John D Lewis Co, Br McKesson & Robbins, Inc, Providence, R I.

Stuart M Mintzer—Converter, Carnac, Inc, New York, N Y.

APPLICATION FOR TRANSFER TO SENIOR MEMBERSHIP

Robert E Maurer

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

57-1

Education: Lowell Technological Institute, Lowell, Mass, BS, textile chemistry & dyeing.
Experience: 5½ years sales service; dyer.
Age: 31; married; veteran; references.
Position Desired: Chemist & technical representative with dyestuff or pigment manufacturer.
Locations: New York, New Jersey area preferred. Eastern seaboard acceptable.

1-28, 2-11

57-2

Education: Keith Academy, Lowell, Mass; Lowell Technological Institute, Lowell, Mass, BS, Textile Chemistry (specializing in textile chemistry and dyeing).
Experience: 10 years, textile plants—plant chemist and development work.
Age: 41; married; veteran; references.
Position Desired: Plant chemist, assistant manager, quality control.
Locations Desired: Northern New Jersey or Metropolitan New York. (Will however, relocate in any part of the country.)

2-11; 2-25

• PATENT DIGEST •

AFTERTREATING OF DIRECT DYEINGS———Dicyandiamide-Formaldehyde plus Ammonium Salts C,4,01

USPat 2,741,535 (Gen Aniline & Film——Streck ——April 10, 1956)

PAUL WENGRAF

It is customary to improve the fastness of direct dyeings by an aftertreatment with aldehyde condensates. These methods are generally unsatisfactory because they frequently affect the light fastness of the final products (as reported in the preamble to the current patent). Also, other drawbacks, such as unstability and lack of solubility of these compositions, are said to occur.

The inventor developed as an aftertreating agent a composition comprising a copper compound, an amino carboxylic acid, an acidic dicyandiamide-formaldehyde condensate and an easily ionizable ammonium salt, also optionally a buffering agent.

The copper compound may be any water-soluble copper salt, such as the chloride or acetate.

The amino carboxylic acid is preferably glycine, also alanin, leucin, aspartic acid or glutamic acid or the like. It acts as a *coordinating compound* to form a soluble complex with the copper salts, thus preventing precipitation of copper hydroxide in the range of about pH 7, as well as avoiding precipitation of the resinous condensate.

The acidic condensate is prepared by condensing an ammonium salt (0.5 mols), formaldehyde (1.5-2.0 mols) and dicyandiamide (1.0 mol). The reaction, starting at room temperature, is exothermic: the temperature is raised to 80-100° C and has to be kept for about 4 hrs (0.5-8 hrs) at this point. The pH should be on the acid side, generally at pH 6.5, and should be maintained at this value.

The ionizable ammonium salt is preferably NH_4Cl or another ammonium salt of a strong acid (phosphoric, sulfuric and so on). During the condensation reaction this salt ionizes; the anion renders the solution acid while the ammonium radical proves to react with the components, forming an integral *part of the condensate*. It has been observed that the best effect is obtained when the *treating solution is kept at a pH close to 7*. Therefore, the addition of alkali or ammonium acetate or generally amphoteric buffering agents to bring the pH to this value is suggested.

Proportions of the ingredients are given as 10-100 p copper compound; 2-50 p aminocarboxylic acid; 0-45 p buffering agent for 100 p of the above formaldehyde condensate.

A solution containing 2% solids is applied to the dyed or printed fabrics at about 140-160° F for 20-30 min. It is substantive to the fibrous material and finally completely exhausted. The fabrics are dried as usual; no further curing is required. A large number of direct azo dyes indicated in this specification can be improved by the current method.

Example (*for the condensate*): 84 g dicyandiamide were introduced into aqueous 38% formaldehyde, the amount corresponding to 54 g HCHO, and 30 g ammonium chloride were added. The pH was measured as 6.5. The temperature rose gradually to 80° C and was kept at 95-98° C for about 8 hrs. The condensate was precipitated by running the liquid in a salt solution, filtered, dried and mixed with one of the copper salts and amino carboxylic acids.

No references have been cited by the Patent Office.

Brit Pat 588,990 (Geigy/1947) [cf *Am Dyestuff Reptr* 37, 136 (1948)] covers the use of dicyandiamide-formaldehyde-ammonium salt condensates for improving the fastness of direct dyeings. The combining of condensates of this type with copper salts or aminocarboxylic acids, however, is not mentioned in this reference. The main purpose of the current patent is obviously to improve the water- and lightfastness at the same time.

POLYACRYLIC FIBERS BLEACHED WITH PERMANGANATE B,2

Brit Pat 742,349 (Un Fabr Belges "Fabelta" ——Dec 21, 1955)

It has been observed that polyacrylonitrile fibers can be bleached by using the permanganate bleaching method, known *per se* but rarely used for natural fibers.

Polyacrylonitrile fibers hitherto have been bleached with chlorite or hypochlorite solutions. Optionally the threads can be treated in gel state with bleaching agents, such as hypochlorous acid or hydrogen peroxide. These processes have been protected by Du Pont's USPats 2,432,447 and 2,432,448 [cf *Am Dyestuff Reptr* 37, 384 (1948)]. It is claimed that no desired whiteness of necessary stability resulted from these methods (lines 21-23 of the current specification).

The method covered in this patent calls for treating polyacrylonitrile fibers with an aqueous permanganic salt at a pH lower than 7 and at 20-100° C, followed by a reducing step to convert the Mn of the permanganate into the divalent colorless Mn^{++}.

Example: One kg of the fibrous material was immersed in a 0.1% potassium permanganate solution, adjusted to pH 2 with sulfuric acid. This solution was kept at 60-100° C for 10 min, thereupon the fibers were dried and immersed in a boiling 2% sodium bisulfite solution, brought to pH 2 with sulfuric acid and left therein for ¼ hr, dried without heating, rinsed and dried.

CREASEPROOF AND PERMANENT FINISHES ———Combination of Aminoplasts with Polyvinylalcohol G,2,04

Brit Pat 742,885 (Joseph Bancroft & Sons Co ——Jan 4, 1956)

Resin finishes made from condensates of urea-formaldehyde, melamine-aldehyde and ketone-aldehyde are well known. On the other hand, polyvinylalcohol-aldehyde condensates, which have been advocated for finishing purposes, reportedly have found no place in commercial production.

Objects of the current invention are, among others: to produce with a smaller amount of resin a pleasing hand of extreme durability and good abrasion resistance; to obtain these results without impairing the tensile strength of the finished goods; to reduce curing temperature and time; to obtain in mechanical (calender) finishes equal results with lower pressure and reduced number of runs; and many others.

Essentially, the resins called for in the current process are copolymers of the usual thermosetting resin precondensates with polyvinylalcohol (abbreviated as PVA). The aldehyde precondensate must be substantially *free of unreacted aldehyde*, which would otherwise react with PVA, preventing the copolymerization of both components.

2-26% of the total resin amount owf must be deposited on the fiber. A 2% deposit, for example, was found to give a good creaseproofing effect and fairly good stabilization,

while a 26% resin content produced a permanent good hand and excellent strength. Durable overall finishes are generally obtained with concentrations in the range 2-10%; higher concentrations result in permanent crease-resistant finishes with good stabilization. Sheer fabrics (so-called "fragile" fabrics) finished with this type of resin reportedly have high durability without substantial loss of tensile strength in contrast to finishes obtained with customary amino resins.

The content of PVA may vary from 0.5-66.7% of the total resin solids. Permanent crease resistance and good stabilization are produced even with low concentrations of PVA. An extensive list of typical formulations and applications in finishing, crease-proofing and embossing processes is presented in the specification.

Example: A white cotton fabric was impregnated with a composition of 4.3 pbw methylolmelamine, 0.8 pbw methylated methylolmelamine, 2.4 pbw urea, 0.6 pbw di (stearamido ethyl) urea monoacetate, 1.2 pbw methyl hydroxy propanolamine hydrochloride (catalyst), and 0.3 pbw PVA in 100 water. The wet pick-up was 65%. After being dried and cured at 275° F for 2.5 min, washed and dried, the fabric was substantially crease-resistant with negligible loss in tensile strength.

DYEING WITH LEUCOVATS SENSITIVE TO HIGH TEMPERATURES——— Hydroxylamine Added C,4,02

USPat 2,742,340 (General Aniline & Film——Marnon——April 17, 1956)

Many vat dyes are highly sensitive in high-temperature dyeing, probably because of overreduction. Some of them exhibit great all-round fastness and good leveling properties, but they are unstable at elevated temperatures, thereby causing weak and specky, uneven dyeings. Inorganic nitrites have been added in the past (see references below).

According to the current specification (col 3, lines 20 and foll), several difficulties have been experienced in applying nitrites as stabilizing agents to prevent overreduction, principally because their full protective action develops only in the bath after reduction has proceeded for some time. Consequently, partial over-reduction may occur before the stabilizing agent, ie, the nitrite, can exert its full effect.

The inventor discovered that this initial overreduction can be remedied by adding hydroxylamine to a dyebath containing nitrite as a stabilizer. Hydroxylamine is preferably added in the form of its salts in a molar ratio of nitrite to hydroxylamine of from about 1:2 up to 4:1.

The maintaining of the dyebath at a certain reduction potential is essential for avoiding insufficient reduction on one side and overreduction on the other side. Limits are between 750 mv and 1100 mv, specifically 930-1050 mv, measured by means of a saturated calomel-platinum electrode system.

Example: White broadcloth was padded through a suspension of Indanthrene Blue BFP and then developed continuously in a Williams unit in a solution containing sodium hydroxide, sodium hydrosulfite, hydroxylammonium sulfate (2 oz/gal) and sodium nitrite (2 oz/gal). A temperature of 200-208° F was maintained throughout the run. The potential was measured at 1025 mv and kept constant under control by feeding variable amounts of a liquid containing sodiumhydroxide, sodium nitrite and hydrosulfite.

References cited by the Patent Office:

Am Dyestuff Reptr 38, P919-22 (1949) (Choquette, Habel) discusses the problem of deterioration of vat dye prints in agers by overreduction and optimum figures of reduction-oxidation potentials measured in mv; also additions of certain stabilizers, such as dextrose or dextrine.

USPat 2,548,543 (Am Cyanamid 1951): vat dyes sensitive to overreduction are dyed in the presence of inorganic nitrites.

USPat 2,548,545 (Am Cyanamid 1951): dyeing with a leuco vat Pyranthrone dye in the presence of an inorganic nitrite [cf *Am Dyestuff Reptr* 40, 605 (1951)].

USPat 2,576,846 (Am Cyanamid 1951): disadvantage in high-temperature vat dyeing is overcome or minimized by adding a nitrogen compound in which N is attached with a covalent bound to O, with another bound to an atom other than O or N. Among the examples, hydroxylamine is also mentioned [cf *Am Dyestuff Reptr* 41, 307 (1952)].

DYEING NYLON——— Pretreatment with Chlorosalicylic or Cresotinic Acids C,4,07

USPat 2,743,231 (Heyden Chemical Corp——Klein, Falcon——April 24, 1956)

Benzoic, salicylic, tannic acids, etc, have been advocated in the past as dyestuff carriers in the dyeing of nylon. These substances possibly act as swelling agents and promoting assistants in dispersing the dyes within the fibers. Quantities as high as 10% of the organic acids are used, sometimes resulting in excessive shrinkage or plasticization of the fibers. Lesser concentrations do not give shades of satisfactory depth.

The inventors observed that high color yields on nylon could be obtained by a *pretreatment with relatively low amounts* of 5-chlorosalicylic acid or cresotinic (ie, hydroxytoluic) acid. Quantities of these compounds as low as 0.5% of the fibrous material, applied before the dyeing process, gave deeper shades than those on untreated nylon or on nylon fibers dyed in the presence of customary carriers (up to 10%). Nylon fibers are treated with chlorosalicylic or cresotinic acid in relaxed state. The samples are then thoroughly washed in warm and cold water and dyed. Therefore the acids do not act as carriers proper. Dyeings of the fibers so prepared compared favorably with those on nonprepared yarns and also with specimens *pretreated with salicylic acid*. Thus the two acids mentioned above are specific for the superior effect.

Example: Nylon fabrics were treated for 3 min at the boil with 0.5-3% of 5-chlorosalicylic acid, cresotinic acid and salicylic acid, washed with warm and cold water and dyed with 1% of Pontacyl Green NV Ex Conc (Du Pont, *CI* 735) or Wool Violet 4BN (Nat Aniline, *CI* 698) in a sulfuric acid—common salt dyebath for 30 min at 190° F. The samples were thoroughly washed and dried. An analogous test was carried out with direct and acetate dyes. A table indicates that dyeing results obtained with these three dyestuff classes were *about equal* in color strength after preparation with chlorosalicylic or cresotinic acids, but much *inferior* after impregnation with nonsubstituted salicylic acid.

References cited by the Patent Office:

Am Dyestuff Reptr 40, 312 (1951) (Anon): discussing materials having permanent or nonpermanent effects on nylon; in the first category, solvents (phenols) acting in high concentration and swelling agents (eg, parahydroxybenzoic acid).

Am Dyestuff Reptr 41, P78 (1952) (Turnbull): carriers used in the dyeing of nylon are reported. Benzoic and salicylic acids for light to medium shades and p-phenyl phenol for medium to heavy shades are suggested.

Brit Pat 614,009 (Marchington & Co——Sutton): pretreatment of nylon with swelling agents, among them cresol sulfonic acid, phenolsulfonic acid, salicylic acid. The material has to be dyed immediately after preparing or can also be dried intermediately.

INDEX TO PATENT DIGEST

FOLLOWING is an index by subject and patent number, of the patent abstracts that have appeared on these pages from August, 1955 through December, 1956. The number in parentheses, following the page number, refers to the year in which the abstract appears.

INDEX BY SUBJECT

ACID VAT DYEING ACRYLIC FIBERS——Heat Aftertreatment
(USPat 2,695,832) 185 (1956)

AFTERTREATMENT OF DIRECT DYEINGS——Guanidine-Formaldehyde Condensates
(USPat 2,736,749) 957 (1956)

APPARATUS FOR CONTINUOUS MULTICOLOR PRINTING AND FLOCKING——
(USPat 2,695,244) 501 (1956)

BLEACHING NYLON——Peroxygen Compounds Plus Aliphatic Carboxylic Acids
(USPat 2,720,441) 960 (1956)

CELLULOSE ACETATE MODIFIED FOR ACID DYEING——Aftertreatment with Salicylic Acid
(USPat 2,690,954) 111 (1956)

COMBINED EMBOSSED AND CHINTZ EFFECTS——Aminoplasts Applied and Cured
(USPat 2,743,190) 843 (1956)

COPPER COMPLEX SOLUTIONS OF NATURAL SILK——Aftertreatment with Alcoholic Acids
(USPat 2,733,975) 364 (1956)

CREASEPROOFING OF TEXTILES——Treatment with Imidazolidone Derivatives
(USPat 2,731,364) 348 (1956)

CREASE-RESISTANT, NONYELLOWING FINISH——Specific Ratio of Two Resin Components
(USPat 2,690,404) 148 (1956)

CUPROUS ION TECHNIQUE IN DYEING POLYACRYLONITRILES —— Water-Soluble and Water-Dispersible Acetate Dyes Combined
(USPat 2,743,993) 982 (1956)

CUPROUS ION TECHNIQUE IN DYEING POLYACRYLONITRILES——Water Soluble Dyes Used
(USPat 2,743,991) 981 (1956)

DISCHARGES IN EMULSION PRINTING——Silicofluorides for Curing Thermosetting Resins
(USPat 2,689,162) 147 (1956)

DURABLE FINISHES——Styrene—Maleic Anhydride Copolymers—Insolubilized with Metal Salts
(USPat 2,698,264) 349 (1956)

DYEING ACRYLONITRILE FIBERS——Cuprous-Ion Technique, Using Furfual
(USPat 2,700,589) 389 (1956)

DYEING DACRON IN BLACK TO NAVY SHADES——Diazocompound and Coupler Applied in Separate Steps
(USPat 2,727,803) 348 (1956)

DYEING GLASS FIBERS——Anthraquinoid Vat Dyes on Substrate of Thermoplastic Resins
(USPat 2,722,488) 982 (1956)

DYEING JIG——Tilting the Material for Leveling-out the Edges
(USPat 2,696,421) 502 (1956)

DYEING NYLON WITH AZODYE COMPONENTS——Developing with Mineral Acids
(Brit Pat 712,144) 110 (1956)

DYEING POLYACRYLONITRILE FIBERS——Cuprous Compounds Slowly Added
(USPat 2,743,992) 981 (1956)

DYEING WITH METAL-COMPLEX AZODYES——High-Substituted Quaternary Compounds Added
(USPat 2,723,178) 983 (1956)

FLAMEPROOFING —— Titanium—Chloride—Acylates in Dilute Solutions
(USPat 2,691,594) 148 (1956)

FUMEPROOFING CELLULOSE ESTERS——Di(dialkylamino) phthalates
(USPat 2,736,631) 957 (1956)

GAS FADING PREVENTION——Alkylaromatic Ethers Linked to Tertiary Amines
(USPat 2,706,142) 404 (1956)

GLAZING OR EMBOSSING COTTON FABRICS——Impregnated with Xanthates, Aftertreated with Formaldehyde
(USPat 2,689,194) 147 (1956)

LEUCO VAT DYES——Stabilized with Cobalt Compounds
(USPat 2,690,952) 652 (1955)

MULTICOLOR PRINTING——Contaminations Detected by Radioactive Substances
(Brit Pat 714,757) 109 (1956)

PASTING FABRICS ON SCREEN PRINTING TABLES——High Alkyl-Methacrylates Used
(USPat 2,719,101) 982 (1956)

PIGMENT-PRINTING EMULSIONS——Ethylene Imine or Isocyanate Derivatives as Cross-Linking Agents
(USPat 2,719,831) 984 (1956)

PIGMENT-PRINTING EMULSIONS——Specific Polymers plus Thermosetting Precondensates
(USPat 2,719,832) 984 (1956)

PIGMENT VAT DYEING ORLON——Developed in Concentrated Sodium Carbonate
(USPat 2,683,644) 109 (1956)

PRINTED CALENDER EFFECTS——Resists under Resin Precondensates
(USPat 2,681,867) 669 (1955)

PRINTING CELLULOSE ACETATE——with Water Soluble Dyes, Thiocyanate Impregnation
(USPat 2,699,373) 959 (1956)

PRINTING COMPOSITION FOR THIOINDIGOID VAT DYES——Metalized Azo-Pigments Added
(USPat 2,780,150 843

PRINTING DACRON——Alkali-free Leuco-vat Pastes Applied
(Brit Pat 712,418) 111 (1956)

PRINTING MORDANT COLORS THICKENED WITH CARBOXYMETHYLCELLULOSE——Sequestering Agents Added
(Brit Pat 712,428) 111 (1956)

PRINTING WITH METAL COMPLEX DIRECT DYES——Solubilized by Substituted Alkylene Diamines
(USPat 2,685,495) 110 (1956)

SETTING OR STIFFENING NYLON FABRICS——Heating with Amphoteric Metal Salts
(USPat 2,734,001) 957 (1956)

SHRINKPROOFING, ALSO CREASEPROOFING WITH MELAMINE CONDENSATES——Modified with Aminosulfuric Acids
(USPat 2,688,607) 669 (1955)

SHRINKPROOFING WOOL——Emulsions of Copolymers of Acrylic Acid and Amido Acrylic Acid Esters
(USPat 2,719,072) 959 (1956)

SHRINKPROOFING WOOL——Ethyleneureido-esters of acrylic methacrylic acids
(USPat 2,686,772) 147 (1956)

SHRINKPROOFING WOOL——Impregnation with N-Alkoxy-Polyamides—Converted to Nylon Substance
(USPat 2,689,193) 669 (1955)

SHRINKPROOFING WOOL——Precondensates Cured in High Frequency Electric Fields
(USPat 2,689,806) 109 (1956)

SHRINKPROOFING WOOL——Water Soluble Derivatives of Nylon Type Compounds
(USPat 2,696,448) 185 (1956)

SHRINKPROOFING WOOL WITH ALKYLATED METHYLOLMELAMINES——Hydrous Oxides Added
(USPat 2,702,258) 389 (1956)

SHRINKPROOFING WOOL WITH PERMONOSULFURIC ACID——Controlled pH Value
(USPat 2,701,178) 959 (1956)

SLIPPROOFING WITH DILUTE COLLOIDAL SILICA SOLUTIONS——Cationic Pretreatment
(USPat 2,693,427) 184 (1956)

STATIC PREVENTION——Dispersions of Polymerized Quaternary Salts Containing Acrylic Chains
(USPat 2,694,688) 349 (1956)

STIFF NYLON FINISH——Polyacrylic Acid, Combined with Polyalcohols
(USPat 2,692,182) 184 (1956)

STRIPPING WOOL IN PRESENCE OF ALKYLENE DIHALIDES——Followed by Acid Stripping
(USPat 2,685,496) 670 (1955)

TARNISH ON COPPER ROLLERS IN VAT DYE PRINTING——Prevented by Copper Chelates
(USPat 2,705,668) 501 (1956)

VAT DYEING NYLON——Pretreatment with Phthalic Anhydride in Phenol Solution
(USPat 2,693,994) 364 (1956)

VAT DYEINGS BUFFERED AGAINST OVERREDUCTION——Trialkanolamine or Manganese Compounds Added
(USPat 2,683,645-46) 670 (1955)

WATER REPELLENT COMPOSITION——Comprising Waxes. Isocyanate Derivatives, Metal Salts
(USPat 2,708,642) 843 (1956)

WATER REPELLENT FINISH——Alkyl-Aryl—Glycol Ethers, Condensed with Quaternaries
(USPat 2,693,430) 349 (1956)

WATER REPELLENT FINISH——Methylolamides of Higher Fatty Acids Combined with Certain Quaternaries
(USPat 2,692,837) 652 (1955)

WATER REPELLENT FINISHES——Organosilicone—Titanium Ester Copolymers
(USPat 2,716,656) 983 (1956)

WATER REPELLENT SILICONATES——Blended with Surface Active Agents
(USPat 2,711,967) 844 (1956)

WOOL DYEING RESIST——Sulfamic Acid Pretreatment
(USPat 2,726,133) 960 (1956)

WOOL-LIKE FINISHES ON CELLULOSE——Formation of Acid-Nitrogen-Complexes—Alkali Aftertreated
(USPat 2,709,638) 958 (1956)

INDEX BY NUMBER

USPat 2,743,993 (Un Carbide & Carbon Corp) 982 (1956)

USPat 2,743,992 (Un Carbide & Carbon Corp) 981 (1956)

USPat 2,743,991 (Un Carbide & Carbon Corp) 981 (1956)

USPat 2,743,190 (Joseph Bancroft & Sons Co) 843 (1956)

USPat 2,736,749 (Arnold Hoffman) . . 957 (1956)

USPat 2,736,631 (Celanese Corp of Am) 957 (1956)

USPat 2,734,001 (Brit Nylon Spinners) 957 (1956)

USPat 2,733,975 (Whitner) 364 (1956)

USPat 2,731,364 (Bad Anil & Sodafabrik) 348 (1956)

USPat 2,727,803 (DuPont) 348 (1956)

USPat 2,726,133 (Sandoz A G) 960 (1956)

USPat 2,723,178 (Am Cyanamid) ... 983 (1956)

USPat 2,722,488 (Gen Aniline) 982 (1956)

USPat 2,720,441 (Du Pont) 960 (1956)

USPat 2,719,832 (Bad Anilin & Sodafabrik) 984 (1956)

USPat 2,719,831 (Bad Anilin & Sodafabrik) 984 (1956)

USPat 2,719,101 (Lankro Chemicals) 982 (1956)

USPat 2,719,072 (Rohm & Haas) ... 959 (1956)

USPat 2,716,656 (Monsanto Chem Co) 983 (1956)

USPat 2,711,967 (Tomarkin) 844 (1956)

USPat 2,709,638 (Jos Bancroft & Sons) 958 (1956)

USPat 2,708,642 (Farbenfabr Bayer) 843 (1956)

USPat 2,708,150 (Am Cyanamid) ... 843 (1956)

USPat 2,706,142 (Gen Aniline) 404 (1956)

USPat 2,705,668 (Allied Chem & Dye Corp) 501 (1956)

USPat 2,702,258 (Am Cyanamid) .. 389 (1956)

USPat 2,701,178 (Stevenson Dyers) 959 (1956)

USPat 2,700,589 (Du Pont) 389 (1956)

USPat 2,699,373 (Brit Celanese) 959 (1956)

USPat 2,698,264 (Monsanto Chem Co) 349 (1956)

USPat 2,696,448 (Montclair Res) .. 185 (1956)

USPat 2,696,421 (Celanese Corp of Am) 502 (1956)

USPat 2,695,832 (Gen Aniline) 185 (1956)

USPat 2,694,688 (Du Pont) 349 (1956)

USPat 2,693,994 (Gen Aniline) 364 (1956)

USPat 2,693,430 (Gen Aniline) 349 (1956)

USPat 2,693,427 (Monsanto Ch Co) 184 (1956)

USPat 2,692,837 (Gen Aniline) 652 (1955)

USPat 2,692,182 (Rohm & Haas) ... 184 (1956)

USPat 2,691,594 (National Lead Co) 184 (1956)

USPat 2,690,954 (Du Pont) 111 (1956)

USPat 2,690,952 (Am Cyanamid) ... 652 (1955)

USPat 2,690,404 (Dan River Mills) . . 148 (1956)

USPat 2,689,806 (Pacific Mills) 109 (1956)

USPat 2,689,194 (Sayles Fin Pl) 147 (1956)

USPat 2,689,193 (Commonwealth Scientif Organ) 669 (1955)

USPat 2,689,162 (Interchemical Corp) 147 (1956)

USPat 2,688,607 (Am Cyanamid) 669 (1955)

USPat 2,686,772 (Rohm & Haas) .. 141 (1956)

USPat 2,685,496 (Harris Res Lab) .. 670 (1955)

USPat 2,685,495 (Ciba Ltd) 110 (1956)

USPat 2,683,645-46 (Am Cyanamid Co) 670 (1955)

USPat 2,683,644 (Deering Milliken Res Tr) 109 (1956)

USPat 2,681,867 (Calico Printers Assoc) 669 (1955)

Brit Pat 714,757 (Meitner) 109 (1956)

Brit Pat 712,428 (Imperial Chemical Industries) 111 (1956)

Brit Pat 712,418 (Imperial Chemical Industries) 111 (1956)

Brit Pat 712,144 (Imperial Chemical Industries) 110 (1956)

Abstracts

Union Dyeing

Bates, T, *Textile Mfr* **82**, 250-2, May, 1956.

The term "union" is now used for all fabrics that are mixtures of two or more different kinds of fibers.

Wool/cellulosic fibers. The dyer can try to select direct cotton dyes that will dye both fibers more or less the same shade; or he can select dyes for the cellulosic fibers which do not dye wool appreciably, and neutral-dyeing acid dyes for the wool. Usually the wool is brought to shade first, and the other fiber is shaded later with addition of direct dye.

In some cases the cellulosic fiber can be dyed with diazotized and developed colors, wool dyes being added to the dyebath which withstand these after-treatments.

Another method is to dye the wool with chromate dyes and the other fiber with direct dyes that are resistant to bichromate.

Good fastness to light is obtained by the use of premetallized wool dyes (eg, Cibalans) in combination with lightfast direct dyes.

Wool/nylon. Selected acid wool dyes are employed which give the same shade on both fibers. In pale shades the nylon has a tendency to dye heavier than the wool, but this can be remedied by the addition of a suitable retarding agent (eg, Reservex WN). In heavy shades the nylon dyes weaker, but the shade can be corrected by suitable disperse dyes added to the bath at 85-90°C. For the wool the acid milling or neutral-dyeing colors are preferred, as they are faster to washing and perspiration than the levelling acid dyes.

Premetallized dyes (eg, Neolan) are applied as in dyeing all-wool, followed by good rinsing to remove all the acid. As a rule these dyes favor the wool and give best results when the two fibers are intimately mixed and when the nylon content is low.

The new premetallized dyes (eg, Cibalans) have good affinity for nylon, and in light shades this fiber is dyed heavier than the wool. It is possible to dye more solid shades in heavy tones with these dyes than with other wool dyes, according to the author.

Chrome dyes can also be used to dye wool-nylon unions in heavy shades. The main difficulty is that nylon does not reduce the bichromate as wool does, and two-color effects may result. Prolonged chroming, and the addition of sodium thiosulfate to the chroming bath, largely overcome this trouble.—WHC

A Study of the Photochemistry of Dyes on Proteins and Other Substrates

Cumming, J W, Giles, C H, and McEachran, A E, *J Soc Dyers & Colourists* **72**, 373-81, August, 1956.

The rates of oxidation and of reduction of dyes in aqueous solution, and of fading in films of a typical protein (gelatin) and a typical nonprotein (methylethylcellulose), have been determined for several series of dyes of different chemical classes.

The authors have reached the following conclusions from these experiments:

A dye may fade either by oxidation or by reduction. Fading on any nonprotein substrate is normally a process of photochemical oxidation involving dye, water and oxygen. The substrate does not necessarily take part in this reaction, though it may do so in special cases, and it may, of course, itself suffer photochemical degradation in a reaction which is independent of the dye fading.

On a protein substrate fading appears to be normally a photochemical reduction process (at least in the early stages of fading) in which some constituent of the protein itself, probably the histidine side-chains, acts as the reducing agent. It is not known whether oxidation occurs in special circumstances on proteins, but this seems likely. It is known that a few particular dyes may be reduced when faded on nonprotein fibers (the reducing agent here must be either the fiber, eg, nylon, or a portion of the dye itself). This leads to the general conclusion that reduction and oxidation are alternative photochemical mechanisms of fading on any substrate, but usually reduction occurs on proteins, and oxidation on nonproteins.

The dyestuffs used included ten acid dyes and four basic dyes, all of relatively low lightfastness. Anthraquinone dyes were not used because of their low rate of fading.

Fourteen references to the literature are cited.—WHC

A Review of Developments in the Properties, Processing and Utilization of Man-made Fibers

Ashton, H and Boulton, J, *J Textile Inst* **47**, P532-63, August, 1956.

This valuable paper reviews developments as follows :

1) The production and consumption of man-made fibers in categories of the older rayon yarns and staple fibers and the newer man-made fibers, with comparisons drawn between production, consumption, and prices for the years 1938 and 1954/55.

2) Some of the developments in the methods of manufacture of man-made fibers and the increasing range and properties of fibrous materials available.

3) The improvements and developments in techniques and machinery for processing man-made yarns and staples, including sizing and yarn preparation, spinning, knitting, weaving, dyeing and finishing.

4) Developments in dyeing and finishing to cope with the increasing variety of regenerated and synthetic yarns and staple fibers now available. Also, the dyeing and finishing of blends of these fibers with each other and with natural fibers.

The authors review the properties and uses of viscose rayon (including the high-tenacity types), cellulose acetate and triacetate, polyamides, vinyl and acrylic fibers, polyesters, polyethylene, alginate, and regenerated protein fibers. The dyeing and finishing of these types of fibers are also discussed.

Regarding fiber blends, the authors state that blended textiles may be produced from rayon, acetate, triacetate, polyamide, polyester, acrylic, protein staples (to mention the established man-made fibers) and from cotton and wool (the outstanding natural fibers). In order to obviate, or even explore, the many factors which limit the use of all these fibers with each other in qualitative and quantitative permutations, research is called for on a massive scale, they state. Some of the problems involved in dyeing these fiber blends are discussed.

The paper concludes with some comments on modern finishes (crease-resist, waterproof, fireproof, etc). The authors predict that the future of the whole finishing field will lie in the wider application of heat treatments, whether it be for resin polymerization or by the relatively simple heat-setting treatments of the thermoplastic fibers, or a combination of both.—WHC

Waterproofing of Cotton Textiles

Anon, *Colourage* **2**, 13-14, June, 1956.

Waterproofing of fabrics is generally divided into two main classes:

a) Methods in which the surface of the material and also the interstices are covered with a film so as

to make the material not only water-repellent but also impermeable to air and moisture. Mainly rubber, drying oils, tars, pitches, cellulose derivatives and flexible synthetic resins are used for this purpose. These finishes are in general not very suitable because the treated material becomes heavy and stiff and the draping qualities are mostly destroyed.

b) Processes in which the material is made water-repellent by coating with a hydrophobic substance or by a chemical reaction, the fabric remaining porous to air. The following methods are used for this purpose:

1) Aluminum compounds applied alone or with soap in order to form a hydrophobic metallic soap. These finishes are cheap but not very durable.

2) Oils, fats and waxes, which are generally applied from solutions in organic solvents or from aqueous emulsions. The emulsion technique is the most widely used and many commercial emulsions are available.

3) Vegetable and animal proteins (eg, casein and gelatine).

4) Macromolecular compounds (eg, Persistol VS, octadecyl ethylene urea). This substance is said to react with the cellulose fiber substance, giving a permanent finish. Insoluble stearic acid derivatives, such as methylol stearamide suitably dispersed (Zelan and Norane are in this group) also give permanent water-repellent finishes on cellulosic materials.

5) Silicone compounds. These give superior water-repellent finishes, particularly on the synthetic fibers.

6) Zirconium compounds, used in conjunction with a wax. These have attained considerable importance in Germany. They are said to be especially successful on rayons and the synthetics.

Choice of the proper water-repellent material is important, because most of these finishes show a selective action on different textile fibers.

Chemical modifications of the cellulose fiber, such as esterification and etherification, are also used to render the fabric water-repellent, and these processes yield permanent results. The chemical reactions involved are described.—WHC

Are Washable Goods Always Washable?

Smith, R B, *Tech Bull (du Pont)* **12**, 46-9, March, 1956.

The author points out that the term "washable" has had many meanings to many people, so much so that the single word "washable" on a label has today little or no meaning. Many fabrics marked "washable" are not washable in the true sense of the word.

The three most important characteristics of a washable fabric, he says, are:

1) A construction and tensile strength which will give satisfactory wear and service
2) Freedom from shrinkage.
3) Colorfastness to washing, light and other agencies which will cause a destruction of color during wear and service.

The ratio and total amount of shrinkage of cotton and liner fabrics are relatively independent of the type of washing formula used, but when we come to consider colorfastness to washing, this is no longer the case, and furthermore, the colorfastness required in any case is directly related to use conditions. For example, colored stripes in men's shirts, or in towels, must be of the highest fastness to properly withstand the required washing procedures; but a lady's dress fabric may give good consumer satisfaction if it can be machine-washed in lukewarm water with negligible loss of color.

The author refers to the AATCC Accelerated Washfastness Tests 2A, 3A, and 4A, and states that these formulas provide sufficient range of washing conditions so that washfastness can be specified over the useful range.

The close correlation between the test results obtained with the accelerated tests and actual washing procedures was built into the test methods by first determining the amount of color loss produced by actual washing procedures on a wide range of fabrics, and then setting up test methods which would produce the same result.

The author also refers to various "use specifications" already adopted or being developed by the American Standards Assn, the National Retail Dry Goods Assn, and the National Assn of Shirt and Pajama Mfrs, and states that the theory back of all of these specification programs is to set a floor under but not a ceiling on textile quality, and to set that floor high enough so that the customer will be protected against merchandise which would not satisfactorily meet the normal conditions of use.

The interest of the manufacturers, converters, and stores in this program springs basically from the belief that it is smart merchandising to supply their customers with goods that will give satisfaction in use.—WHC

Fading and Related Effects Associated with the Radiation from Light Sources

Cooper, B S, *Textile Mfr* **82**, 369-70, July, 1956.

In order that materials should exhibit some change in properties (such as fading or loss of strength) as a result of being illuminated, two conditions must be fulfilled, the author said.

1) The material must absorb some of the radiant energy incident upon it. For example, visible light alone cannot induce a change in the properties of a perfectly transparent colorless substance, although it may well do so with a colored substance.

2) The light energy that is absorbed must be transformed in one particular way. It is not sufficient that it should merely be absorbed—which could lead to other types of transformation process, such as heating or fluorescence. The absorbed radiation must excite the molecules of the substance so that they enter into chemical reactions or (in extreme cases) are dissociated.

With an undyed textile fiber, the amount of light absorbed in the visible and near ultraviolet region is small; the rate of degradation (loss of strength) of the fiber is consequently low. The presence of certain types of dye, or even pigments such as zinc oxide and titanium oxide, which absorb in the visible and/or near ultraviolet region of the spectrum, sensitize the reaction by making the radiation available for the degradation of the fiber. At the same time, the dye itself may photo-oxidize and bleach, with consequent reduced effect in sensitizing the degradation of the fiber. It is also possible that a side-reaction product of the fiber degradation (eg, peroxide) may increase the bleaching of the dye. The complexity of the process thus becomes apparent, since substrates behave differently according to the dye, while conversely, dyes are affected by the presence of the substrate. The amount of weakening of the textile varies enormously from one textile to another.

The author illustrated his lecture by accounts of abnormal light fading and tendering which he had investigated.—WHC

Synthetic Macromolecules and Their Importance in Textile Processing

Hochtlen, A, *Textile J Australia* **31**, 223-31, April, 1956 (translated from the German, *Textilber* **35**, 1263-8, 1954).

The purpose of the author is to indicate the great variety in which the synthetic macromolecules occur, and their very numerous possibil-

ities.

Synthetic macromolecules, according to his definition, include "those compounds which are obtained by purely synthetic means and which do not exceed a certain molecular size." Products obtained by modification of natural fibers are thus excluded.

Macromolecules can be distinguished from normal chemical compounds by "the regular and frequent succession of certain atom groupings linked by principal valences." Their m w may be as low as 10,000-30,000 (eg, polyamides) or as high as 500,000 (native cellulose). They may have a straight or a spherical structure ("linear or sphero colloids"). Fibers are made from the linear colloids, while resins (eg, for crease-proofing) are sphero colloids.

The synthetic macromolecules may be divided into three classes, according to the method of preparation:

1) Condensation of two dissimilar substances (eg, phenol-formaldehyde).
2) Polymerization (of a single compound) and co-polymerization of different types of compounds).
3) Addition polymerization (formation by chemical reaction on the textile).

The chemistry of these various types of polymer is explained by the author in much detail.

The most important and significant groups of polymers for the textile processors are listed, and some examples of practical application of synthetic macromolecules in textile processing are suggested. Preference is given to those products which are water-soluble or can be used in aqueous dispersion, or which can be produced from water-soluble precondensates on or in the fiber.—WHC

Some Remarks on the Degradation of Dyeings in Inclement Weather

Niederhauser, J P, *Can Textile J* 73, 47-53, Sept. 7, 1956.

This paper, evidently translated from the French, gives an interesting account of certain exposures to light and weather conducted by the author in France on a series of 38 dyeings on cotton and wool, dyed with different classes of colors.

The weather tests were carried out at three different locations, for periods of 20 days, two months, and 4½ months. Duplicate samples were exposed in the Weather-Ometer for 20, 80, and 220 hours. Sets of the AATCC Light Fastness Standards and the British Standards (BS-1006) were also exposed, both to weather and under glass.

A table is included in which all the 38 dyeings are rated for fastness, both in the natural weather test and in the Weather-Ometer test. These ratings show that the exposure to natural weather produces extremely varying fading, depending on the location and the season, and that it is impossible to rate the samples used in this study in the order of fastness, since the results vary considerably from one series of exposures to another. As to the tests in the Weather-Ometer, the author finds that they are very often "extremely remote" from those obtained in natural weather.

He refers to the paper by Butterworth and Guthrie (JSDC 71, 587, 1955), which described exposure tests made by them with the AATCC and British light standards, both to weather and under glass. That paper reported that the British standards are unsuitable for outdoor exposure; the AATCC standards can be used for this purpose, but the fastness scale is reduced (eg, Standard 8 is rated only 5-6). The present author confirms this.

He concludes that it would appear to be very difficult in the actual state of our knowledge to codify the fastness to weather and to state a precise method permitting rapid determination of the fastness to this test.

Several references to the literature are cited.—WHC

Polyvinyl Alcohol Fibers

Carpenter, G E and Wheeler, O L, *Textile Research J* 26, 317-22, April, 1956.

The first polyvinyl alcohol fibers, produced in 1931, were water-soluble and were intended for special applications.

The Japanese started a development program on polyvinyl alcohol in 1940, resulting in the production of a fiber, known as Vinylon, and a resin called Poval. The various steps in the synthesis of Vinylon from acetylene are described.

Vinylon (sp gr 1.28) is one of the lightest of all fibers. Its softening point (220°C) is not far below that of Orlon. It has about three times the electrical resistance of cotton. It is insect, mildew and fungus resistant. Although Vinylon clothing has good crease retention, it wrinkles easily.

The dry tenacity of the commercial Vinylon fiber varies from 6 to 8 g/d. In the laboratory, however, tenacities over 10 g/d have been achieved.

The chemical resistance of Vinylon is said to be excellent. At 20°C it is practically unaffected by 20% sulfuric acid, 10% nitric acid, 40% caustic soda (discolored only), various phenols and methanol. It is dissolved by concentrated acids.

A large variety of dyes are said to be available for imparting pastel shades to Vinylon material, but brilliant hues are difficult to obtain. Perhaps the fiber's most serious shortcoming is the lack of wet-heat resistance. Originally the material shrank badly in boiling water, but it will now withstand water at approximately 120°C, according to the authors. It is recommended that Vinylon garments be dried before ironing.

The authors believe that Vinylon is destined for an accelerated expansion in Japan and early industrialization in Germany. They discuss the economics of Vinylon production, and state that at present the price is considerably higher than that of cotton and the cheaper cellulosics, but much below that of nylon, Orlon and Dacron.

Nine references to the literature, mostly Japanese, are cited.—WHC

1957

KNITTING ARTS

EXHIBITION

APRIL 29 - MAY 3

ATLANTIC CITY, NJ

•

THE

1957 KNITTING ARTS

EXHIBITION NUMBER

OF

AMERICAN DYESTUFF

REPORTER

WILL BE PUBLISHED

APRIL 22

News of the Trade

26th Annual Meeting of ISCC to be Held Mar 5-6 in NY

The 26th Annual Meeting of the Inter-Society Color Council will be held in the Keystone Room at the Statler Hotel in New York on Wednesday, March 6, 1957. This will be on the day preceding the Optical Society of America meeting which will be held on the three days following at the Statler. It should be noted that the papers at the Optical Society meeting relating to the broad subject of color will be scheduled for Thursday, March 7th for the convenience of the Inter-Society Color Council members and guests.

Helen D Taylor, chairman of the Delegation from the Tanners' Council, is Program Chairman for the 26th Annual Meeting and is assisted by Ralph Pike, Chairman of the Delegation from the Federation of Paint and Varnish Production Clubs.

The meeting will start on Tuesday evening, March 5 at 7:30 pm with a presentation of the *House and Garden* magazine plan for coordination of colors for home decoration. Members and guests of the Inter-Society Color Council are invited to attend this presentation by Elizabeth Burris-Meyer, consulting colorist for *House and Garden* magazine and author of several books on color and decoration. In order to permit viewing of the elaborate displays associated with this presentation, this portion of the program will be held at the magazine's headquarters at 420 Lexington Avenue, New York. Tickets may be obtained from Ralph M Evans, ISCC secretary, Color Technology Div, Bldg 65, Eastman Kodak Co, Rochester 4, NY.

The morning session on Wednesday, March 6, 1957 will start with registration from 8:30 am to 9:30 am. This will be followed by the reports of the chairmen of the delegations from the 26 Member-Bodies and of the various subcommittees of the Problems' Committee that are now active as well as the Annual Business Session.

At 2:00 pm Wednesday afternoon a panel of four speakers will present a symposium on "Recent History of Consumer Color Choice." The moderator will be Mrs Taylor. This symposium will emphasize the importance of analysis of styling and color trends to production planning and sales promotion of colored commodities. Problems of color correlation and simplification have become conspicuously important as a result of the post-war trend to give the consumer the privilege of liberal choice in color selection. With a full-color gamut commercially available, the search for color preference in the mass markets has led to the development of a variety of techniques in analysis of trends and appraisal of their significance. Many of the basic tools of color science have been effectively used in resolving problems in commercial color selection. An interesting program has been arranged to describe some of the methods and results of recent color trend analysis in the textile, plastic and paint industries; and their application in fields of automotive color styling and home decoration.

The three speakers are: Textiles—Elschen Hood, coordinator of color research, Coats and Clark, Inc, New York, NY

Plastics—Albert J Benjamin, supervisor of color styling service, Monsanto Chemical Co, Plastics Division, Springfield, Mass

Paint—Everett R Call, director, Statistical Division, National Paint Varnish and Lacquer Association, Inc, Washington, DC.

The banquet will be held on Wednesday evening in the Keystone Room of the Statler. The speaker will be George J Pollard, Jr, staff assistant, automotive design, General Motors Corp, Detroit, Mich. He will speak on "Color in Product Styling," stressing importance of color in the automotive and appliance industry and the influence of future planning on standard product design.

Durfee Author of New Book

Walter C Durfee, 463 Commercial St, Boston 13. Mass, a charter member of AATCC, is the author of a new book entitled, "Alphabetics as a Science", which outlines an apparently prehistoric Science in Human Speech, in terms of the existing English alphabet. It includes some (Irish) ogam, some early Hebrew, some Egyptian archaeology, some Sanskrit, a Trojan relic, and Chinese. Mention is made of the 3 and 4 season calendar problem, and of the practical imitation of the "Knotted Cord" of prehistoric days.

The book, part of the Philosophical Library, sells for $4.75.

Record Attendance Anticipated for 1957 KAE

With more than 220 exhibitors scheduled as of January 28, and an extensive attendance program underway, the 1957 Knitting Arts Exhibition at Atlantic City, April 29-May 3, is expected to set a high mark in interest for a record attendance of United States and foreign knitting industry executives.

The coming event is the 43rd in a series begun in 1905 and the third under the triple sponsorship of the National Association of Hosiery Manufacturers, the National Knitted Outerwear Association and the Underwear Institute. Attendance at the 1955 Knitting Arts Exhibition was 9,500.

"Automation for increased profits" is being underscored in all communications to potential visitors.

Attendance promotion is being intensified for the April show. Increased textile trade journal advertising, new series of news releases to the general newspapers in production areas and extensive overseas publicity through trade publications will be followed by exhibitors' distribution of tickets.

Intercontinental Chemical Acquires Majority Interest in Carbic Color

Intercontinental Chemical Corp, New York, NY, associated with Farbwerke Hoechst AG, Frankfurt-Hoechst, Germany, has purchased the majority interest in Carbic Color & Chemical Co, Inc, New York, NY, one of the oldest dyestuff distributors in the United States.

There will be no change in the management of the company, and Carbic Color & Chemical Co, Inc, will continue to sell the same dyestuffs as heretofore. They also will add to their sales line imported dyestuff specialties of Farbwerke Hoechst AG and products manufactured by Metro Dyestuff Corp, West Warwick, RI, another affiliate of Intercontinental Chemical Corp.

Intercontinental Chemical Corp also owns the controlling interest in Progressive Color and Chemical Co, Inc, New York, which will continue to sell chemicals, intermediates, and a variety of other products manufactured by Farbwerke Hoechst AG.

Resins, Inc Building in Manila

Reichhold Chemicals, Inc, has announced that Resins, Inc, is building a new plant in Manila, PI, for the manufacture of synthetic resins for Philippine industry. This associated company will operate the plant under license from RCI using its technical knowledge and processes. Plant capacity, initially, is expected to be six million pounds annually.

This will be the twenty-third foreign plant manufacturing RCI resins. RCI owns thirteen plants in the US.

6th Southern Municipal and Industrial Waste Conference

The Sixth Southern Municipal and Industrial Waste Conference will be held in the new College Union Building on the campus of North Carolina State College, Raleigh, N C, on April 1 and 2.

This year's conference will highlight conservation measures as a means of controlling stream pollution. The keynote speaker will be Senator Wayne Morse (D-Ore) who will speak on water conservation measures.

The annual conferences are sponsored jointly by Duke University, the University of North Carolina and North Carolina State College. They have as their objective the bringing together of administrators of municipalities, industries and governmental agencies to delineate their respective responsibilities in pollution abatement. These conferences are actively supported by the states of Virginia, North Carolina, Tennessee, South Carolina, Georgia and West Virginia.

Persons interested in attending the conference should contact Nelson L Nemerow, Operating Committee Chairman, North Carolina State College, Raleigh, N C.

PTI Dedicates Classroom in Memory of John Naab

A classroom at the Philadelphia Textile Institute has been dedicated to the memory of John Naab, a former teacher at the Institute who passed away in February, 1956. Mr Naab began his teaching career in September, 1911, and would have completed forty-five years of teaching in September, 1956.

One thousand dollars was contributed by friends of Mr Naab so that the dedicated room could be remodeled.

George E Linton, dean of the Textile Division of the Fashion Institute of Technology and a graduate of PTI, '17, accepted the responsibility of chairman of the John Naab Fund.

New chairs for the classroom were donated by Walter Golaski.

Present at the dedication ceremonies were officials of the college and Mrs Naab and family.

AHA Textile Testing Facilities at U of I

The American Hotel Association has added to its textile testing facilities at its laboratory at the University of Iowa. Additional equipment has been purchased enabling the laboratory to run all the tests called for in the American Standard L24 Minimum Performance Requirements for Institutional Textiles. The Laboratory operates under direction of L A Bradley, AHA's laundry and textile consultant.

Estimating that member hotels spend more than $100,000,000 a year on textile products, the AHA sponsored the project to set up the L24 Standards, which were adopted last year. More and more hotels are specifying on their purchase orders that textile products must meet or exceed these standards, and it is expected that the volume of testing for the new laboratory will increase rapidly.

Approximately $4,500 has been spent to purchase equipment so that all tests required to determine whether textiles meet the L24 Standards can be made. Major pieces of equipment installed were the Fade-Ometer, using artificial sunlight for determining the lightfastness of color, and the Launder-Ometer for determining color fastness to washing.

Other equipment includes the compress-ometer for measuring warmth of blankets, the scorch-tester for determining damage from excess bleach, and the crockmeter for testing whether color rubs off on other textiles.

Cannity

Hunter Expands Southern Facilities

James Hunter Machine Company has established its recently acquired southern division, W D Dodenhoff Company, Inc, 745 Lowndes Hill Road, Greenville, SC, as southern sales and service headquarters for two other Hunter divisions, Thomas Leyland Machinery Co, and Hunter Controls, Inc.

Ernest Cannity, senior sales engineer of the company, is being transferred from the main plant at North Adams, Mass, to the southern headquarters at Greenville.

Armour Offering New Quarterly

The first issue of a new quarterly publication, "Ideas in Development," is being sent to industrial research executives and others interested in research by the Chemical Division of Armour and Company, Chicago 9, Ill.

The booklet is designed to cover the latest developments of the Armour Chemical Division, and may be used as a reference source of new ideas.

Karl M Bierman, manager of the market development department, explained the publication will report research activity on new chemicals or new applications for existing products.

Howard Bates, assistant to L A Bradley, at the Launder-Ometer in AHA's textile laboratory at the University of Iowa.

27th Annual Meeting, TRI

A sweeping and highly informative symposium on acrylic, vinyl and dinitrile fibers, which have carved out a strong position among synthetics for the textile industry and hold even greater promise for the future, will highlight the 27th Annual Meeting of Textile Research Institute of Princeton, NJ, at the Hotel Commodore, New York, NY, March 14-15, according to John H Dillon, TRI director.

He explained that top-flight scientific and technical personnel from firms producing each fiber would be on hand to present papers and to answer questions from the audience at the day's completion.

Program for the two-day meeting, which has been arranged by Willard W McLeod, general chairman of the meeting and vice president, Coats & Clark, Research Laboratory, Newark, N J, will be as follows:

The Thursday morning and afternoon sessions will have as chairman J B Goldberg, consultant to the textile and allied industries. He will also act as moderator for the question and answer period.

Opening the morning will be a presentation on "Properties and Uses of Acrilan" by Frank J Soday, vice president, research and development, The Chemstrand Corp. C H Bendigo, technical director, American Cyanamid Co, will give a paper on Creslan. The morning proceedings will close with a talk by Richard D Smith, B F Goodrich Chemical Co, on Darlan.

At the luncheon, Sydney M Cone, Jr, TRI president and vice president, Cone Mills Corp, will speak on "The State of the Institute".

Talks on the fibers, their properties and applications, will continue on Thursday afternoon. A paper on Dynel will be delivered by J M Swalm, Carbide & Carbon Chemicals Co. W W Heckert, Textile Fibers Department, E I du Pont de Nemours & Co, Inc, is to give a presentation on Orlon. Data on Verel will be outlined by Harry W Coover, Tennessee Eastman Co, while G W Stanton, director of research, The Dow Chemical Company, will cover Zefran.

A get-together of the Institute's trustees will be held late Thursday afternoon.

The program for Friday is:

"TRI Research in 1956", by Dr Dillon. A brief discussion on the research findings reported will follow.

"Cotton Merchandising Changes to Conform with Modern Mill Requirements" by Earl E Berkley, director, fiber & spinning laboratory, Anderson, Clayton & Co.

"An Appraisal of Shrink-Resistant Treatments for Wool" by Arnold M Sookne, assistant director, Harris Research Laboratories.

"New Fibers in Tire Cord" by Gerald Mallory, head of Cords and Fabrics Section, Research Division, Goodyear Tire & Rubber Co.

Chairman of the Friday morning program will be W Hale Charch, director, pioneering research, E I du Pont de Nemours & Co, Inc, who is also chairman of TRI's General Research Advisory Committee.

A glimpse into "Fiber Forming Materials of the Future" will be given by the guest luncheon speaker, Prof Herman Mark of the Polytechnic Institute of Brooklyn. New TRI officers will also be introduced at the luncheon.

An impressive array of textile testing apparatus, instrumentation and fiber exhibits will again be set up in the West Ballroom, adjacent to the meeting hall. Displays will be open to the general public on both days from 9:00 A M to 5:00 P M.

It is stressed by Dr Dillon that the Institute's annual meetings are open to all interested in textile research and development. Registration fee for the meeting is $8.00 and luncheon tickets will be available for $5.00 on each day. Advance reservations may be made by writing to the Institute's Secretary, PO Box 625, Princeton, N J.

Production Underway at Solvay's Brunswick Plant

The new Brunswick, Georgia chlorine-caustic soda plant of Solvay Process Division, Allied Chemical & Dye Corporation, which recently underwent preliminary testing of equipment, has begun full commercial production.

The new installation represents the first step in Solvay's two-part construction program at Brunswick. Liquid caustic soda (50% NaOH) will be available in both regular and rayon grades. While no dry forms of caustic soda are presently planned, 70-74% liquid will be available with completion of the second step in the fall of 1957.

Liquid chlorine will be shipped in standard single unit tank cars of 16-, 30- and 55-ton capacity.

Served by the Southern and Atlantic Coast Line Railroads, the Solvay plant will also ship caustic soda by barge to consumers in the Southeast.

In addition to its Brunswick plant, Solvay has chlorine-caustic soda facilities at Syracuse, NY, Baton Rouge, La and Moundsville, W Va.

Symposium on "Minimum Care" Fabrics

The industry-wide trade symposium on "minimum care" or "wash and wear" fabrics, sponsored by the Textile Section of the New York Board of Trade, will be held on Thursday, February 28th (12 noon) at the Sheraton Astor Hotel, according to a recent announcement made by Cameron A Baker, United States Testing Company, and Jackson F Spears, Burlington Industries, co-chairmen of the event.

The meeting, Mr Baker stated, will feature a panel of outstanding speakers representing producers of fibers, yarns and fabrics; dyers and finishers; garment manufacturers; sales and advertising; consumer groups; soaps and detergents; launderers; drycleaners; retailers and home laundry equipment manufacturers.

William Wright, Jr, vice president, J Walter Thompson Company, newly elected as chairman of the Textile Section, pointed out that "By means of this symposium we hope to make a substantial contribution towards clarifying the widespread misunderstanding that currently prevails regarding the type of fabric which qualifies as "minimum care" or "wash and wear" fabrics.

The meeting is open to all interested businessmen and the general public. Reservations can be made by contacting Harry Legg, executive secretary, Textile Section, New York Board of Trade, 291 Broadway, BArclay 7-9494. Tickets are $8 per person including luncheon.

Gillette Acquires HRL

The Gillette Company has acquired Harris Research Laboratories, Inc, an independent Washington (DC) research company.

Carl J Gilbert, Gillette president, said the acquisition will permit the company's three manufacturing divisions to broaden materially their research programs in safety razors and blades, home permanent waves and other cosmetics, and ball-point pens.

Gillette has been one of Harris Research Laboratories' principal industrial clients for more than ten years.

In addition to performing research for Gillette, the laboratories will continue to serve other industrial clients under the same corporate name and with the same personnel, Gilbert said.

Harris Research Laboratories was established in December 1944 by Milton Harris, who is presently director of research of the Gillette Company.

Morningstar, Nicol Dedicates New Hawthorne Facilities

At recent cornerstone ceremonies, Morningstar, Nicol, Inc, dedicated new plant facilities in Hawthorne, N J, which reportedly will triple its production potential and double its floor space in that city. The setup, one of the most modern in the world today for grinding, blending, treating and compounding of water-soluble gums, inaugurates what is believed to be the first air-convection system for specialty starch and gum blending.

The occasion also commemorated the 105th anniversary of the business (dating from the original Charles Morningstar operations) at the very site where the J M & J S Nicol operations began over 75 years ago. The merger occurred in 1929.

The new facility is the latest link in the 9-plant production network of Morningstar, Nicol and its industrial adhesives subsidiary, Paisley Products, Inc, and the last step in a 1956 expansion program involving more than a million dollars. Both the former Jersey City and Hawthorne activities will be combined in the new spread, and wholly devoted to the refining and processing of natural gums (karaya, arabic, guar, locust bean, ghatti, agar agar, tragcanth and Irish moss) plus the production of specialty and treated starches (potato, arrowroot, tapioca and sago) and the dextrines made therefrom. To some degree, the firm's three plants in the Maine potato country will supply the Hawthorne plant, and the Hawthorne plant will in turn supply intermediates to the New York, Chicago, St Louis, Los Angeles and northern California units.

Although the use of scientifically processed water-soluble gums has been widespread throughout the textile, chemical and other industries, an accelerating demand for new gum blends and specifications is being influenced by dramatic new uses. Increases in requirements for the specialty and treated starches may be laid principally at the door of the textile, adhesives, food and paper industries.

No fewer than five laboratories and one pilot plant will supplement the production facilities at Hawthorne. Separate laboratories will be devoted to products for the paper industry, gum grading and development, basic research, plant control, and food formulation.

Production equipment is characterized by a completely enclosed air-float handling system for the dry materials as they flow through the cleaning, separation, blending, grinding, and bagging or drumming operations.

Joseph Morningstar, chairman of the board of Morningstar, Nicol, Inc, handles the trowel at the dedication of the new Hawthorne starch and gum-treating plant on the 105th anniversary of the founding of the firm. George J Muller, president, and Murray Stempel, executive vice-president and builder of the adhesives subsidiary company, Paisley, flank his right and left respectively.

Operation is electronically controlled by push-button from specially designed panel boards, where pneumatic instruments and actuators are coordinated and flow rates are traced from one step to another through the plant. The system is entirely enclosed and dust tight with vertical bag dust collectors on the roof. Color dynamics, automatic sprinklers, a central vacuum cleaning system, modern construction and ample lighting distinguish the plant from the standpoints of safety, good housekeeping and pleasant working conditions.

Construction is of reinforced concrete designed for 300 lb per sq ft floor loading. Frontage measures 350 ft and more than 60,000 sq ft of operating space has been added to an equivalent amount in the older plant. Operation is under the direction of Edwin M Hillary, vice president, production and construction, Morningstar, Nicol, Inc.

Officiating at the ceremonies were Joseph Morningstar, chairman of the board and the third of five generations of Morningstars in the business; George J Muller, president; Murray Stempel, executive vice president; and Mayor Louis Bay of Hawthorne. In addition to Mr Hillary, Thomas W Morningstar, secretary, and vice presidents Earl C Lenz, sales, Sam Schuller, technical director, J P Strasser, paper department, and L J La Brie, technical coordinator, helped host employees, local civic leaders and their families.

The firms' Canadian subsidiary, Morningstar-Paisley of Canada, Ltd, has established a new Toronto Office and Warehouse at 207 Queens Quay West, Toronto 1, Ontario—Telephone EMpire 6-0848.

Robin T Hazell has been appointed sales and service representative with headquarters at the Toronto office.

Warehouse stocks of the company's products will also be established at Montreal. Canadian subsidiaries and affiliates of US firms will, thus, have supplies and services quickly available from both eastern Canadian hubs of production.

Plans for the near future also include producing in Canada the full line of Paisley liquid vegetable, casein, animal glue and polyvinyl resin adhesives.

TRI Seminar Schedule for Spring

The Spring, 1957 Seminar schedule of the Textile Research Institute began on Feb 7 with the presentation, "Microscopical Studies of Dyeing at Low and High Pressures," by Henry E Millson, Organic Chemicals Div, American Cyanamid Co.

The remaining schedule through May 29 is as follows:

Feb 21—"Effect of Processing on Cotton Fiber Properties," Ludwig Rebenfeld, TRI

Mar 7 — "Interactions between Fabrics and Coatings at Elevated Temperatures," Irvin M Gottlieb, TRI

Mar 21—"Anionic Polymerization," Prof Michael Szwarc, Dept of Chemistry, College of Forestry, State Univ of New York

Apr 4—"Mechanical Interaction of Textile Fibers and Textile Processes," Prof Henry Morgan, Dept of Mechanical Engineering, Mass Institute of Technology

Apr 18—"X-ray Studies on Long and Short Range Order in Cellulose," James H Wakelin, TRI

May 9—"Relaxation Effects in Polymer Solutions," Bruno Zimm, General Electric Research Laboratory, Schenectady, NY

May 16—"Stress Relaxation as a Tool for Studying Molecular Structure of Fibers," Richard E Heitman, TRI

May 29—"Moments and Moment-generating Functions of Distributions with a Few Applications," Prof John C Whitwell, TRI and Dept of Chemical Engineering, Princeton Univ.

Each seminar will be held at 2:30 pm at the TRI laboratories, Princeton, NJ.

Textile Market Research Conference

The first textile conference devoted exclusively to market research will be held in Washington, DC, May 28-29, according to an announcement made last month by Colonel Francis J Beatty, president of the National Cotton Council.

"If American textiles are to get their rightful share of the consumer dollar, we must more closely scrutinize our textile markets and in the light of research findings expand demand for textile products," Colonel Beatty said.

The nation's key textile leaders will be invited to attend the two-day session and bring with them persons responsible for market research activities, including representatives of market research agencies.

The Council president listed four main objectives of the meeting: 1) to foster a wider understanding and appreciation of the function of market research as a tool for stimulating demand; 2) to forge closer working ties among technicians so as to encourage the exchange of information and ideas required in building effective research and sales programs for textiles; 3) to provide a medium through which management needs can be accented all down the line—a medium which will also bring market data, source of data, new market research techniques, and significant economic developments to the attention of all individuals working to increase textile consumption; and 4) to encourage these researchers, in turn, to pool their knowledge and talents and thus broaden the whole base of market research operations in the textile field.

National Adhesives To Occupy New English Plant

National Adhesives Ltd, the English affiliate of National Starch Products Inc, is erecting a polymerization plant in Slough, England.

According to Ronald M L Francis, managing director, the new plant is expected to commence operation in March 1957. It is planned to produce polymers of vinyl acetate for use in the textile and other fields. Facilities will also be provided for the production of formulated resin adhesives.

Included in the construction is the erection of a new laboratory to house the expanded development, service and control facilities.

Upon completion of the polymerization unit, a new adhesive manufacturing plant and office building will be erected to replace the present units which have been in use for many years.

National's operations at Slough have expanded rapidly since the war and the consolidation of all its facilities in one area is expected to provide better service for the company's customers in the British Isles and throughout their export market.

National Starch also operates polymerization plants at Plainfield, NJ and Meredosia, Ill.

(L to r): G A Mobbs, director of Slough Estates; Ronald M L Francis, managing director of National Adhesives Ltd; Arthur R G Williams, director of National Adhesives Ltd, and C W Fairall, director of Slough Estates inspecting the new polymerization plant of National Adhesives Ltd now under construction at Slough, Bucks, England.

New Industrial Consulting Corporation

The formation of a new firm of industrial consultants was announced last month by George T Bayley and John B Calkin. The new organization, known as Calkin & Bayley, Inc, with offices located at 50 East 41st Street, New York, N Y, will specialize in marketing and economic research, product and market development, process development and design, business and plant surveys, analysis and testing. Industries to be served include, among others, textiles, chemicals, and packaging.

Calkin

The officers of the corporation are John B Calkin, president; George T Bayley, executive vice president; Robert Frank, vice president in charge of marketing and economic research; John L Parsons, vice president in charge of pulp and paper.

Mr Calkin, who has had a consulting office at 500 Fifth Avenue, New York, N Y, was formerly associated with Foster D Snell, Inc. Mr. Bayley was with the chemical advertising department of the *Journal of Commerce* for the past five years. Prior to that he was associated with Stauffer Chemical Corporation in sales and market development capacities.

Dr Frank held various technical positions. For eighteen years he was associated with American Cyanamid Company and Chemical Construction Corp and more recently was a private consultant.

1957 Fall and Winter Color Cards for Woolens and Man-Made Fibers and Silk

The Color Association of the United States has released the regular editions of its 1957 Fall and Winter Color Cards for Woolens and Worsteds and for Man-Made Fibers and Silk to members. Each card presents a fashion range of forty advance fall colors, including important basic shades and two featured collections of brilliant hues and winter pastels for sports and evening wear.

In the basic groups, a general lightening of tone is noted, as compared to the palette of the previous winter. The red scale is prominent with special emphasis on the bluish or rosy tonalities, as raspberry and ruby versions. Orangy and coral-tinged reds are also included. Amethyst and iris tones express the strong fashion interest in the mauve family.

The continued importance of the beige to brown range is forecast in mocha and frosty cocoa shades, also in more muted clay and sandy types. Spicy, amber and golden tones lend animation to this fall collection. The subdued taupe family is newly interpreted in the grayish smoky quartz and pumice versions and a misty brownish tone. Dove and flint grays indicate the trend to lighter tones in this neutral range.

Blues in the advance fall spectrum favor the softened medium shades of Dutch pottery. The greener cast in blues is reflected in bird and sea tones. Subtle grayed moss and bronzy tonalities and rich pine shades are foremost in the green range.

Appel to be Awarded Harold DeWitt Smith Medal

American Society for Testing Materials Committee D-13 on Textile Materials will present the Harold De Witt Smith Memorial Medal to **William D Appel**, chief, Textiles Section, National Bureau of Standards. The presentation will be made on Thursday, March 21, during the Spring Meeting of Committee D-13, March 19 to 22, in New York.

Mr Appel has had a long and distinguished career as scientist and leader of research and of service to the industry through his activities in various scientific and technical associations and societies.

After graduating with honors in zoology and chemistry from the University of Chicago in 1917, and prior to becoming associated with the National Bureau of Standards, he worked as research chemist on dyes for leading manufacturers. He joined the staff of the Bureau of Standards in 1922 as dye chemist in the Division of Chemistry. He was promoted to the position of chief of the Textiles Section in January, 1929. He has continued in this position to the present time, and in addition, has served as assistant chief of the Division of Organic and Fibrous Materials since 1954.

Mr Appel has taken a prominent part in the development of standards for test methods and specifications. He served three terms of two years each as Chairman of Committee D-13. In 1948, he was a delegate to the organization meeting of Technical Committee 38 on Textiles of the International Organization for Standardization held at Buxton, England. Also he was a leader of the USA delegations to the 150 meetings in England in 1951 and 1956.

He has had many honors. He received the War Department Certification of Appreciation for Patriotic Services during World War II and also the American Standards Association Certificate of Appreciation for services on war standards (World War II). In 1953 he received the Department of Commerce Gold Medal for Exceptional Service, the highest award of the Department given in recognition for outstanding contribution to public service, the nation, or humanity. In 1954, he was awarded the Olney Medal, highest award of the American Association of Textile Chemists and Colorists.

Price Reduction For Ethylene Diamine

A price reduction of four cents a pound for ethylene diamine produced by Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation, became effective Jan 1, 1957. This brings the tank car price for ethylene diamine down to forty cents a pound.

The lower price is reportedly made possible, in part, by production economies and process improvements that stem from Carbide's doubling ethylene diamine production capacity at Texas City. The new ethylene diamine facilities, just put in operation, are designed to meet the growing use of this product for textile resins, sequestering agents, polyamide resins, and fungicides.

It is claimed that the upswing in high-fashion cottons has been accentuated by the use of reactive resin finishes based on ethylene diamine. These new finishes impart wrinkle resistance to cotton fabrics and make them more serviceable and more easily ironed. Ethylene urea produced from ethylene diamine is reacted with formaldehyde to yield 1, 3-dimethylolimidazolidone-2, the cross-linking agent that gives wrinkle resistance to cotton. Most sequestering agents used in textile applications are based on salts of ethylene diamine tetracetic acid.

Analytical Pocket pH Meter Offered As Separate Item

The Analytical Pocket pH Meter, manufactured by Analytical Measurements, Inc, Chatham, NJ, has been sold for the past five years as a complete unit for $125.00. Many users now stocking spare probe units and batteries have requested that the pH meter itself be offered as a separate item.

Accordingly, Analytical Measurements, Inc is now offering the instrument (Catalog No. 100-01) for $96.00, fob Chatham, NJ.

TECHNICAL LITERATURE

CHEMICALS FOR THE TEXTILE INDUSTRY—*Rohm & Haas Co. Textile Chemicals Dept, Philadelphia 5, Pa*—Revised booklet T25C dated January, 1957, lists chemicals as to product name, type and use. Sections include: Reducing and Stripping Agents; Desizing Materials; Resin Finishes (thermosetting and thermoplastic); Synthetic Sizes (water-soluble polymers); Dispersing Agents; and Surfactants (wetting, scouring, level dyeing, finishing). This edition replaces all previous editions.—*8 pages and cover.*

General Calendar

AMERICAN OIL CHEMISTS SOCIETY
Spring, 1957 (Spring meeting, New Orleans); Sept 30-Oct 2, 1957 (Fall meeting, Cincinnati); Apr 21-23, 1958 (Memphis); Oct 20-22, 1958 (Chicago); Spring, 1959 (New Orleans); Fall, 1959 (Los Angeles).

AMERICAN MATERIAL HANDLING SOCIETY
Apr 29-May 3 (7th Materials Handling Exposition, Convention Hall, Philadelphia, Pa)

AMERICAN SOCIETY FOR QUALITY CONTROL
Feb 25-27—7th Annual Conference of the Textile Division, Georgia Tech, Atlanta, Ga.

THE DRYSALTERS CLUB OF NEW ENGLAND
Apr 26 (Hotel Vendome, Boston); June 21 (Annual Outing—Wachusett Country Club, West Boylston, Mass).

THE FIBER SOCIETY
Spring Meeting—May 1-2, 1957, The Clemson House, Clemson S C; Sept 4-6 (Joint meeting with the Textile Institute—Hotel Statler, Boston, Mass)

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS
NATIONAL KNITTED OUTERWEAR ASSOCIATION
UNDERWEAR INSTITUTE
April 29-May 3 (1957 Knitting Arts Exhibition, Atlantic City, NJ)

NATIONAL COTTON COUNCIL OF AMERICA
Feb 28-Mar 1 (Cotton Research Clinic, General Oglethorpe Hotel, Savannah, Ga). October 2-3 (Chemical Finishing Conference—Statler Hotel, Washington, DC)

PHI PSI FRATERNITY
April 25-27—Annual meeting, New Bedford Hotel, New Bedford, Mass.

PHILADELPHIA TEXTILE INSTITUTE ALUMNI ASSOCIATION
March 1 (56th Annual Banquet, Bellevue-Stratford Hotel, Philadelphia, Pa); June 6-8 (Alumni Day, Alumni Outing, PTI Commencement)

PURDUE UNIVERSITY
May 13-15 (12th Purdue Industrial Waste Conference, Purdue Univ, Lafayette, Ind)

SCALAMANDRE MUSEUM OF TEXTILES
Jan-Mar, 1957 (Exhibit—"Two Hundred Years of Textile Designs"

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Feb 14, Mar 12 (Palm Terrace Suite, Hotel Roosevelt, New York, NY); May 26-28 (Annual Outing, Skytop, Pa); June 11, Sept 10, Oct 8, Nov 12 (Palm Terrace Suite, Hotel Roosevelt, New York, NY)

TEXTILE QUALITY CONTROL ASSOCIATION
March 28-29 (Spring Meeting, Clemson House, Clemson, SC)

New Shear-Flow Feature

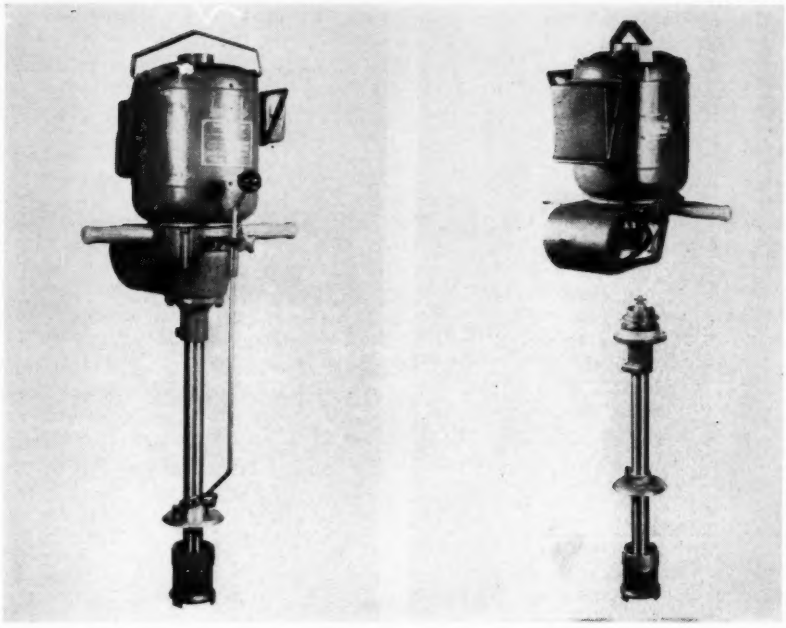
Gabb Special Products, Inc, Windsor Locks, Conn, manufacturers of Shear-Flow industrial mixers for the textile and chemical industries, recently announced a new design development.

The new Shear-Flow feature is the interchangeability of mixing heads.

The complete mixing head is a compact, self-contained unit consisting of the mixing shafts, stator-housing, counter-rotating impellers, seals and all related parts. It can be removed from the motor and drive assembly quickly and easily. Removal of four retaining bolts and loosening of the drive belt disengages the mixing head permitting the insertion of a new head as soon as the other is removed.

This quick-change feature was designed to reduce to a minimum nonproductive down time at maintenance periods.

Spare mixing heads are available from Gabb for all production models in 3-impeller sizes. All parts subject to immersion are constructed of corrosive-resistant materials.



Photos show assembled Shear-Flow mixer (left) and same unit with mixing head disengaged. Interchangeability of mixing heads is a new feature.

Keetide Fabrics

The development of a new, durable "chlorophobic" finish which reportedly imparts to natural-look fabrics, especially whites, important minimum-care features plus the ability to withstand possible damage from chlorine retention when exposed to hypochlorite bleaches, was announced last month by Joseph Bancroft & Sons Co. Patent protection has been obtained on the chemicals and the process, and additional protection is being sought on improvements.

Textiles produced by this process will be marketed under the trade name Keetide, and will form a new group in the family of Everglaze fabrics. It is stated that the new chemical process can be applied to cottons and other cellulosics and their various blends to prevent the damage and yellowing which sometimes result from the normal use of chlorine bleaches on resinated white fabrics in home and commercial launderings. Field tests reportedly show that everglaze Keetide fabrics have durable resistance to wrinkling, soiling and perspiration stain and odor. They require little or no ironing. It is further stated that these fabrics can be stabilized within Sanforized requirements, or to any desired percentage, depending upon the end use of the article or garment.

The effectiveness of the new formula used in producing Everglaze Keetide fabrics is based on the reasonable use of normal bleaches which contain a chlorine base.

While this development is presently only in limited production, Bancroft officials have said that there is already a tremendous interest in Everglaze Keetide fabrics for manufacturers of men's shirts, women's blouses, and similar garments which require minimum-care qualities and yet are subjected to chlorine bleaches in laundering. Full scale production is expected in about three months.

Sevron Brilliant Red 3B

Production of a new cationic dye for Orlon acrylic fiber, Sevron Brilliant Red 3B, was recently announced by the Du Pont Company's Dyes and Chemicals Division.

This dye reportedly produces a bright, bluish-red shade with good fastness properties. It is said to be especially suited for use with other recently announced Sevron dyes, such as Yellow R, Orange G, and Brilliant Red B, to produce bright reds similar to lipstick and jockey red shades.

Sevron Brilliant Red 3B dyes rapidly at the boil and requires the use of a retarding agent to insure level dyeings particularly in light shades. The dye reportedly builds up well to a maximum strength of five percent and is unaffected in shade by differences in the pH of dyebaths over the pH range of three to 10. It is said to be excellent for dyeing the Orlon component in blends of Orlon and wool since little wool staining occurs.

Orzan P

Orzan P, a new member of a group of surface-active, lignin sulfonate chemicals for industry, is now being marketed by Crown Zellerbach Corporation, 343 Sansome St, San Francisco, Calif.

Orzan P reportedly has the unusual property among lignin sulfonates of precipitating readily from solutions and clinging to fibers or other materials present. A spray-dried powder, Orzan P may be precipitated from even dilute solutions by the addition of alum, it is claimed. Recommended uses are: as a binder for fibers, an emulsifier, an emulsion stabilizer, a flocculant, and a dispersant.

The Orzans are derived from the chemically significant noncellulose portion of the tree, the spent liquor resulting from the manufacture of paper by the sulfite process. Lignin sulfonates are said to have an outstanding ability for dispersing articles in water and holding them in suspension.

New Acrylic Monomer Available in Pilot Plant Quantities

Dimethylaminoethyl methacrylate monomer is now available in pilot plant quantities from Rohm & Haas Company. The new water- and solvent-soluble monomer, which is supplied with 0.25% N,N'-diphenyl-p-phenylene diamine (DPPD) as an inhibitor, may be polymerized with an azo-type catalyst, such as azoisobutyronitrile, or by irradiation with ultraviolet light. Dimethylaminoethyl methacrylate can also be polymerized in aqueous solution with peroxide catalysts, provided the amine group is first neutralized with an acid to give a water-soluble salt.

Copolymers of dimethylaminoethyl methacrylate and methacrylic acid have been of particular interest because these amphoteric polyelectrolytes ("polyampholytes") appear to be somewhat analogous to proteins in their behavior in aqueous solution. With molecular weights in the range of 270,000 to 330,000, these copolymers are typical ampholytes, combining with both acids and bases. They are reportedly soluble not only in water, but also in strong organic solvents and in dry methanol, dioxane, ketones, benezene and higher alcohols.

Copolymers of dimethylaminoethyl methacrylate with methacrylate esters and with acrylonitrile have also been formed. Although the pH of aqueous systems must be maintained at 7 or below because of rapid hydrolysis, it can be expected that the monomer may be copolymerized with other monomers, such as butadiene and vinyl acetate.

Suggested applications of dimethylaminoethyl methacrylate are in many cases based on applications described for homologous dialkylaminoethyl methacrylate or analogous products such as vinylpyridines. They include, among others, mordant for fixing soluble dyes in photographic film; anchoring agent for pigments, waxes and oils to paper, fabrics and leather; antistatic agents for synthetic fibers; and acid acceptors; cationic precipitating agents; stabilizer for chlorinated polymers, in the fluosilicate form as a moth-proofing agent, or copolymerized with methacrylic acid as an amphoteric thickening and suspending agent.

Technical notes on pilot plant quantities of dimethylaminoethyl methacrylate are avilable from Rohm & Haas Company, Washington Square, Philadelphia 5, Pa.

Eastman "50" Acetate Fiber

A new form of acetate fiber, Eastman "50", available in both Estron and Chromspun, was announced recently by Eastman Chemical Products, Inc, a subsidiary of Eastman Kodak Company. The new Eastman "50" acetate yarn was developed and will be produced by Eastman Chemical's corporate associate, Tennessee Eastman Co.

Eastman "50" yarn reportedly imparts many improved characteristics to fabrics in which they are used. Compared with the conventional form of acetate yarns in fabrics of identical constructions, new Eastman "50" is said to give:

1) Better cover with from 5% to 10% greater bulk;
2) A crisper, firmer hand along with a fuller, smoother feel;
3) Equal or better fabric tear strength and abrasion resistance;
4) A higher, more uniform luster with more intense fabric highlights;
5) From 3% to 5% greater insulation;
6) Longer retention of fabric characteristics.

It is stated that the new Eastman "50" yarn, while improving fabrics in which it is used, makes no change in the general properties and characteristics of either Estron or Chromspun. Tensile strength, elastic recovery, moisture regain, effect of heat, age, sunlight, acids and other chemicals all remain unchanged.

Of particular interest is the claim that the new Eastman "50" acetate yarn processes better than regular acetate on conventional textile equipment, and affords better loom efficiency, while dyeing and finishing of fabrics made of the new yarn is handled in the same manner as regular forms of acetate.

Market evaluation studies are claimed to have already indicated the superiority of new Eastman "50" yarn in such fabrics as crepes; taffetas, including crystal-filled taffetas; velvets; luana-type fabrics; satins; linings; lastex fabrics for swimwear and foundation garments; tricots; and drapery fabrics.

Eastman "50" yarn is priced the same as conventional Estron and Chromspun and is delivered in the same put-ups.

While present production of the new Eastman "50" yarn is meeting delivery schedules, substantial mill and converter interest already indicates an increase in production will be necessary to handle trade demand for the new form of Eastman acetate fiber.

Dynel Sewage Filter Covers

Use of Dynel filter covers on rotary vacuum sewage filters has been found to result in operational, material and labor cost savings in municipal and industrial sewage treatment plants, according to Albany Felt Company, one of the leading filtration textile producers.

Made from Dynel, acrylic fiber of Union Carbide and Carbon Corporation, the fabrics are reported to last many times longer than other cloths previously used. It is stated that Dynel's exceptional resistance to attack by fungus and bacteria, as well as its inert character in the presence of acids, alkalis and chemicals, make it an outstanding filter medium for such work. It is further stated that, because of the fiber's characteristics, Dynel filters are not affected during shut-down periods in sewage plants not operating around the clock. This is significant in plants expressly built to over-capacity for purposes of future expansion.

Albany Felt supplies filter covers of Dynel in full width and length pieces, without seams, up to 195 inches wide and 40 feet in circumference. These blankets which lend themselves to an excellent nap, are usually held on to the cylinder by a wire wrapping spaced every two inches or so around the circumference. An indication of the long life of Dynel is shown by the fact that in some cases the covers have outlasted the wire wrapping previously used.

The longer useful life of Dynel covers also has eliminated frequent changeovers, the firm states, which is an important economy factor, and taxpayer incentive in municipal installations. Also, inexpensive washing procedures have been developed for removing excess accumulations of calcium and sludge from the covers while in place.

As an illustration of the economies of Dynel filter covers, Albany Felt cites one instance where a sewage treatment plant previously using an inexpensive fabric cover obtained an average of 200 hours of useful life. After changing to Dynel, the same plant reported useful life of 2,500 to 3,000 hours. In round figures this meant fifteen times the former life was experienced at only about three times the initial cost of the cheaper cover.

Additional information on sewage filtration problems, Dynel filter covers and other filtration textiles is available from Albany Felt Company, Industrial Fabrics Division, Albany 1, New York.

• NAMES IN THE NEWS •

Joseph B Quig, an internationally recognized authority on textile fibers, retired from the Du Pont Company at the end of January.

Dr Quig joined the Du Pont Company in 1926, as a technical assistant in rayon manufacture at its Old Hickory, Tenn, plant, after receiving a master's degree in science and a PhD at Iowa State College where he was a graduate fellow.

Between 1928 and 1942, he was manager of customer service, first for Du Pont rayon and then actetate, moving from New York to Wilmington, Del, in 1936, when the Du Pont Rayon Company became the Rayon Department of E I du Pont de Nemours & Company.

During this period, when he conducted the trade evaluation of nylon previous to the building of a pilot plant for its initial manufacture, Dr Quig became a prominent figure in the textile industry. As a pioneer in the successful adaptation of rayon and acetate to many forms of textile processing, he wrote and delivered numerous technical papers before such groups as the AATCC, AATT, and TRI.

As assistant director of development in Du Pont's Rayon Technical Division between 1942 and 1950, Dr Quig guided the introduction of Fiber A and Fiber V, later known as Orlon acrylic fiber and Dacron polyester fiber, respectively, through their early stages of application.

With the reorganization of Du Pont's Rayon Department as the Textile Fibers Department in 1952, Dr Quig was appointed a research manager in the Textile Research Division.

In 1945, immediately after World War II, Dr Quig was appointed to the "textile team" which was formed by the Foreign Economic Administration to investigate the man-made fiber industry in Germany, Austria, and Italy. He received a Certificate of Appreciation for his part of this work.

Roy C Newton, vice president of Swift and Company, Chicago, Ill, has been unanimously selected to receive the 1957 gold medal of The American Institute of Chemists. The medal is being given in recognition of Dr Newton's leadership in food technology and his service to the profession.

The presentation of the medal will be made at the 1957 Annual Meeting of the Institute, to be held at the Sheraton-Mayflower Hotel, Akron, Ohio, May 22-24.

Gillick

Hencken

Appointments of **Thomas J Gillick, Jr** as manager of the Engineering and Research Division of American Felt Company and of **Harold G Hencken** to succeed Mr Gillick as the company's director of engineering activities, effective immediately, have been announced.

Both appointments follow the recent retirement of **Hugo Boeddinghaus** as vice president in charge of American Felt Company's Engineering and Research Division, a position he has held since 1941.

Mr Gillick, who holds several technical society positions, is chairman of the Western New England Section of the American Association of Textile Chemists and Colorists. From 1949, when he joined American Felt Company, to 1954, he was chief chemist and director of quality control at the company's Glenville, Conn, plant. He was appointed director of engineering in 1954.

Mr Hencken joined American Felt Company in February, 1956 as a research engineer on product development work.

Pollard

Raymond F Pollard has joined the Warwick Chemical Division of Sun Chemical Corporation as textile sales manager.

Mr Pollard was employed at the Cranston Print Works for many years, and has also served other textile firms in important positions.

Permanent headquarters for Mr Pollard are located at the Sun Chemical Building on Long Island City, NY.

On Monday, January 14 at the Hotel Statler, the U S Customs Laboratory at New York sponsored a Testimonial Dinner in behalf of **Herbert W Eckweiler**, retiring assistant chief chemist. In the group of about 200 who attended the Testimonial Dinner were many Government officials and trade representatives. Those who addressed the gathering, in addition to Toastmaster **Richard E Fitz-Gibbon**, chief of the Customs Section, Office of Assistant U S Attorney General, New York, NY, were **Webster J Oliver**, chief judge, US Customs Court; **George Vlases, Jr**, chief, Division of Technical Services, Bureau of Customs, Washington, DC; **E F Kenney**, chief chemist of the New York Customs Laboratory; **William Gardner** of Allied Chemical & Dye Corp; Miles A Dahlen of Du Pont, representing the Synthetic Organic Chemical Manufacturers Association; **Albert MacC Barnes**, president, Association of the Customs Bar, New York, NY; and **Harry Frumess**, president of the New York Customs Examiners Association.

Mr Eckweiler was employed by the Federal Government for 33 years. He served as assistant chief chemist from 1935 with the exception of 3 years during World War II when he served as assistant to the director, Mica-Graphite Division, and chief of the Mica Section, War Production Board, Washington, DC.

Mr Eckweiler's duties at the US Customs Laboratory consisted of supervising the analytical work on a large variety of products, consultation and advice to customs officers and the public on technical matters, as well as aid to government attorneys in the preparation, presentation and briefing of court cases on technical subjects.

Mr Eckweiler will enter the consulting field, confining his efforts to the tariff aspects of the chemical, mineral and allied fields.

L W Newton has been appointed assistant to the vice-president—research, of Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation.

Dr Newton, who joined Union Carbide in 1941, had served as assistant superintendent of research since 1954. He has been engaged principally in administrative duties at Carbide's research Center in South Charleston until his current promotion.

Stern

Steed

Jerome Stern and Charles J Steed, Jr have been promoted to sales supervisors for the east and midwest respectively for National Starch's Resin Division.

Mr Stern joined National's New Products Development group in 1951, later becoming product supervisor, specializing in the promotion and sale of vinyl copolymers as well as developing several of National Starch's resin applications. He will continue to operate from the Plainfield, NJ, sales office.

Mr Steed has represented National in the Midwest area for the past three years in the sale of vinyl resins. His headquarters will continue to be in Chicago.

Arthur D H Ward, formerly with Fox-Wells Co Inc as quality control, sales and development expert for the past ten years, will join the staff of Northern Dyeing Corp, Washington, N J, on February 1. He will be in charge of sales promotion and serve also as a construction technician.

Two research and development chemists and a technical sales representative have been added to the staff of the Coatings and Adhesives Department of the Borden Company's Chemical Division.

The research and development chemists are **Charles W Bayley, Jr,** who will work on latex, and **Austin I Weber,** who will specialize on coatings. **Philip E Coyle, Jr,** is the new technical sales representative, who will cover the Eastern New England territory.

Mr Bayley comes to Borden's after long activity in the latex field. He formerly was chief chemist at Dee's Adhesives and Chemical Company, Inc, Lynn, Mass, and research and development chemist for General Latex and Chemical Corporation, Cambridge, Mass.

Mr Weber was formerly with the Gates Engineering Co, Wilmington, Del, where he served as a development chemist.

Mr Coyle has been with the United Shoe Machinery Corp and the Heveatex Corp.

Nelson

Bradley

Dewey H Nelson, formerly assistant to the sales manager, has been promoted to sales manager of Becco Chemical Division, Food Machinery and Chemical Corporation, Buffalo, NY. He succeeds the late **John F Shea,** who was vice-president in charge of sales at the time of his death on November 26, 1956.

Joseph F Bradley, associated for the last five years with Woonsocket Color & Chemical Co, recently joined Francolor, Inc, Division of Compagnie Francaise des Matieres Colorantes, in the capacity of technical sales representative.

In his new capacity, Mr Bradley will be in charge of the new laboratory, which has been established by Francolor, Inc, in its offices at 162 Main Street, Woonsocket, RI. In addition, Mr Bradley will be visiting the trade in the Blackstone Valley Area of Central Massachusetts, Rhode Island, and in the Fall River area of Massachusetts.

Fred M Rawicz, vice chairman of the North Carolina State College Student Chapter, AATCC, has been named the winner of the 1957-8 Celanese Corp of America Fellowship at N C State College's School of Textiles.

Rawicz will receive a $1,800 academic award covering one year of graduate study.

Crest Chemical Corporation, Newark, N J, has announced the election of **Maurice Grayson** as partner and director in charge of all sales. Mr Grayson has been in the textile field for over twenty-five years.

The appointment of **William R Calabrese** as district sales manager was announced at the same time.

Edwin Schlesinger, formerly chief design engineer, has been appointed manager of the Engineering Department of the Dyestuff and Chemical Division Plant of General Aniline & Film Corporation at Linden, NJ.

Brumberger

Green

Robert C Brumberger has been appointed manager of chemical industry sales for Nuodex Products Co, a division of Heyden Newport Chemical Corporation.

From 1950 to 1955 Mr Brumberger was associated with Nuodex as manager of industrial fungicides and as chemical industry manager. From 1955 to 1957 he was a special representative for Rexton Finishes Inc.

The management of Imperial Paper and Color Corp, Pigment Color Division, Glens Falls, NY, has announced the appointment of **Floyd W Green** to the position of director of technical service. Dr Green brings to his new assignment a technical background gained from fifteen years in the Corporation's Research Laboratory. In his new position he will direct the activities of the Technical Service Laboratory.

Raymond J Lodge and **Charles W Smith** have been appointed department general managers for the Borden Company's Chemical Division. Mr Lodge now heads up the Resins and Chemicals Department, and Mr Smith, the Polyco-Monomer Department. **Eugene J Sullivan,** who has been top administrator for both departments, recently was advanced to general sales manager for the entire Chemical Division.

Mr Lodge, a Borden 20-year man, has held a number of sales and administrative posts in the Chemical Division. Most recently, he was general sales manager for the Polyco-Monomer Department.

Mr Smith joined Borden's in 1951 as head of chemical engineering at Bainbridge, N Y. In 1956 he became assistant general manager for both the Resins and Chemicals and Polyco-Monomer Departments.

Raymond G Haislip, formerly with Geigy Chemical Corp as a chemist and demonstrator at Charlotte, N C, for four years, has been named Southern representative for United Aniline Co.

en

been ap-
industry
Co, a
Chemical

mberger
as man-
and as
. From
l, repre-
s Inc.

al Paper
or Divi-
nounced
Green
echnical
his new
kground
he Cor-
ory. In
rect the
Service

arles W
depart-
he Bor-
Division.
Resins
and Mr
Depart-
ho has
oth de-
nced to
entire

r man,
nd ad-
hemical
as gen-
Polyco-

n 1951
ring at
became
r both
Polyco-

y with
chemist
, N C,
named
United

1, 1957